NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 14

LUNAR MODULE (LM)
ONBOARD VOICE
TRANSCRIPTION
(U)

RECORDED ON THE
LUNAR MODULE
ONBOARD RECORDER
DATA STORAGE EQUIPMENT
ASSEMBLY (DSEA)

FEBRUARY 1971

GROUP 4
Downgraded at 3-year
intervals; declassified
after 12 years

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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
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INTRODUCTION

This document is the transcription of the Apollo 14 flight crew communications recorded on the lunar module (LM) data storage equipment assembly (DSEA). After the multiplexed voice communications and mission elapsed time had been recorded on board the LM on a single track of the tape, the tape cassettes were transferred to the command module (CM) for the return to Earth. The cassettes were forwarded to NASA Manned Spacecraft Center, Houston, where mission elapsed time was converted to ground elapsed time for this document. Transcription of these tapes was managed by David M. Goldenbaum, Test Division, Apollo Spacecraft Program Office, to whom inquiries concerning this document should be referred.

The transcript is divided into three columns — time, speaker, and text. The time column consists of four two-digit pairs for days, hours, minutes, and seconds (e.g., 04 22 34 14). The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.

Beginning with this mission, the time used by Mission Control Center (MCC) and indicated as ground-elapsed time (GET) in the flight plan was updated to both the spacecraft and MCC computers but was not updated to the telemetry downlink pulse-code-modulated bitstream or other time-recording devices. This GET updating was performed only to correct significant changes in flight-plan time occurring as the result of midcourse corrections or spacecraft burn-time differences (trajectory dispersions).

Therefore, the Apollo elapsed time (the true mission-elapsed time) does not always agree with flight-plan and MCC times. Users of this transcript are cautioned to apply the appropriate time-update deltas for the updated periods.

In the text, a series of three dots (…) designates those portions of the communications that could not be transcribed because of garbling. One dash (-) indicates a speaker's pause or a self-interruption. Two dashes (--) indicate an interruption by another speaker or a point at which a recording was abruptly terminated. A series of three asterisks (***}) indicates voice clipping caused by use of the voice-actuated (VOX) mode. Dashes in the time column indicate that the time could not be determined because of the use of the VOX mode.

The Apollo 14 mission was flown January 31 to February 9, 1971; lift-off occurred at 21:03:02 G.m.t. (04:03:02 p.m. e.s.t.) on January 31. The CM was designated Kitty Hawk and the LM was called Antares.
Speakers in the transcript are identified as follows:

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<td>Commander</td>
<td>Alan B. (Al) Shepard, Jr.</td>
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<tr>
<td>CMP</td>
<td>Command module pilot</td>
<td>Stuart A. (Stu) Roosa</td>
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<td>Lunar module pilot</td>
<td>Edgar D. (Ed) Mitchell</td>
</tr>
<tr>
<td>SC</td>
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<td></td>
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UNDocking Preparation to PostUnDocking

04 07 46 28 LMP -- ON, S-band.
04 07 46 36 CDR What the hell are we doing with that on there?
04 07 46 38 LMP What's that? Houston, I have you locked up on the steerable.
04 07 46 50 CC ...
04 07 46 57 CDR Okay, let me keep you on this, now.
04 07 46 59 CMP Okay.
04 07 47 03 CDR We might not get in there which-zillion times, but --
04 07 47 09 LMP Ask him to hold off on it until you do.
04 07 47 13 CDR All right. Give me about 5 seconds, Stu. Need another 5 seconds.
04 07 47 17 CMP Okay. I'm showing 10. I'll make it 15.
04 07 47 21 CDR Okay. Good.
04 07 47 22 LMP Give me BIOMED, LEFT; PC*** HI.
04 07 47 28 CMP Okay. They're zero. Will you be ready to go at 5? Are you ready, Al?
04 07 47 34 CDR Okay. Ready.
04 07 47 35 LMP No.
04 07 47 36 CDR We're ready; go.
04 07 47 38 CMP Okay. Okay, you're moving out --
04 07 47 42 LMP We're clear --
04 07 47 43 CDR No, we're not.
04 07 47 44 CMP  --- ... probe. We'll wait until ... damp here. Okay, we seem real steady. I'm going to back off from you.

04 07 47 57 CDR  Okay.

04 07 47 58 CMP  And we're free.

04 07 48 00 CDR  Very good.

04 07 48 09 CDR  Okay, we had a normal undocking, Houston. Okay.

04 07 48 17 LMP  Okay. DEAD BAND, MIN; VERB 77; go to PO0.

04 07 48 37 CDR  Okay. We're in PO0.

04 07 48 40 LMP  Okay. Yaw left, 60; pitch up, 90.

04 07 48 43 CDR  Okay, starting left yaw, Stu.

04 07 48 46 CMP  Okay. Boy, you look mighty pretty out there.

04 07 48 54 CDR  And starting the pitchup. Pitch up, 90.

04 07 49 04 LMP  Yaw right, 60; yaw left, 60; pitch up, 90.

04 07 49 11 CC  Antares, Houston. We've lost data on you, now.

04 07 49 21 LMP  We'd like your - what you ended up with in NOUN 83.

04 07 49 22 CDR  Roger. We ended up with ---

04 07 49 25 LMP  Minus 0.1 - minus 0.1, 0.

04 07 49 26 CDR  Plus 0.1, minus point ---

04 07 49 27 LMP  Minus 0.1 ---

04 07 49 29 CDR  Minus 0.1, plus 0.1, and 0.

04 07 49 33 LMP  Shit. Try it again. Minus 0.1, minus 0.1, 0.

04 07 49 36 CC  Okay. Houston, you reading?

04 07 49 37 LMP  Go ahead.

04 07 49 37 LMP  Minus 0.1, minus 0.1, and 0.
04 07 49 44 CC  Okay. Minus 0.1, minus 0.1, and 0.
04 07 50 03 LMP  Houston, I have you back on the OMNIs. It doesn't seem to be tracking.
04 07 50 11 CC  Roger, Antares.
04 07 50 17 LMP  I'll give you LO bit rate, if you want it.
04 07 50 31 CC  Okay, Antares. You can stay in HI.
04 07 50 35 LMP  Roger.
04 07 50 47 CDR  See them yet?
04 07 50 48 LMP  Not yet.
04 07 50 55 CDR  Ought to see them pretty soon.
04 07 51 00 CMP  Okay, Al. You're around - you want me to verify your tracker light?
04 07 51 05 LMP  Okay. There's your tracker.
04 07 51 07 CMP  And it's loud and clear.
04 07 51 10 CDR  Zero degrees and down.
04 07 51 12 LMP  There he is. Okay, Stu, we have you; and I have the camera on; and you look mighty pretty out there.
04 07 51 29 CMP  Okay, I've been taking a few shots of you, there.
04 07 51 34 CDR  Okay, ...
04 07 51 40 LMP  He's got it rate.
04 07 51 47 CDR  Okay, where are we in the time line?
04 07 51 50 LMP  Okay. We've got the VHF ANTENNA to FORWARD - Here, put it over here, so we can see it. We're in good shape.
04 07 52 06 CDR  We'll be in good shape as soon as we can get these helmets and gloves off, here.
Yes. Okay, we're right here. The TRACKING LIGHT's ON and OFF and verified; VHF ANTENNA is FORWARD. Turn the sequence camera off.

TAPE RECORDER, OFF.

TAPE RECORDER is OFF.
PDI PREPARATION TO POSTTOUCHDOWN

04 11 43 38 CC  noise, and drop the downlink - drop your downlink -

04 11 43 43 CDR  Okay. I'm ready for it.

04 11 43 44 CC  so we can get it back in there.

04 11 43 46 LMP  Okay.

04 11 43 50 CDR/LMP  Okay.

04 11 43 51 LMP  Let me - let me have the downlink.

04 11 43 52 CDR  Okay. Here it comes.

04 11 44 00 LMP  Okay.

04 11 44 01 CDR  Is the tape -

04 11 44 02 CC  Antares, Houston. ...

04 11 44 03 CDR  TAPE RECORDER, ON.

04 11 44 04 LMP  Go ahead. It's ON. Let's go to VOX.

04 11 44 08 CDR  AUDIO MODE, VOX.

04 11 44 09 CC  ...

04 11 44 10 CDR  Okay.

04 11 44 12 LMP  Okay. I've got my downlink.

04 11 44 23 CDR  Okay. Do your VERB 83 as soon as we complete here.

04 11 44 24 LMP  Okay.

04 11 44 25 CDR  Okay, how do you read in VOX, Houston?

04 11 44 27 LMP  And how do you read Ed? ...

04 11 44 29 CDR  Okay.

04 11 44 40 LMP  Okay.
Okay, there's your VERB 83 coming up.

Very good. That looks good; 317, looks good; 883, that looks good. Let's go to 277; that looks good. Great. All right, I can start loading the AGS pad, now. 231, plus 56963. ***96***40 is the same.

Right.

Plus ***6963.

8254.

8254; plus 05428.

Right.

05428.

***1; plus 00037.

Plus 00037; 00037 ... --

Okay. ***2 minus --

***2 minus -

00147.

00147; 62, minus 00147.

Right. ***04.

***04.

Minus 12345.

Minus 12345. Okay. That's entered. Let me run back through them very quickly.

Okay.

***31 read-out, 56963; that's good. *** read-out, 56963; that's good. ***254 read-out - Check me on these - plus 5 - 05428.
Go.
61 read-out, plus 00037.
That looks good.
62 read-out, minus 00147.
Okay.
And 404 is a large negative number: 12345.
Okay.
Okay, let's press on.
... up on minus 10.
Okay, we're a little ahead of time.
Okay. I think, Houston, what we'll do just before we enter the final trim is to call you to get the *** set at that time. Do you concur?
Okay, but we seem to be fairly successful at resetting by tapping; so, if it shows up prior to that time, then let us know.
Let me read this: the limit set goes in.
Ignition plus 26; MANUAL THROTTLE.
... 
And I'll put these other calls in just as quick as I can get them in.
Yes, one right after the other. Okay, what's going on ...
Go ahead.
Okay, we'll get it - would have gotten it on our checklist, Fred. We're not quite there yet.
Go ahead and change our DPS burn.
...
Roger. 56978, CLEAR 231; plus 56978, ENTER.
40***5497***, ENTER. Okay, Fred; they are in.

AUTO COMMANDER, AUTO again.

... It went through ... down to ... pretty well ...
... ABORT STAGE, RESET; DEAD BAND, MIN; ROT
CONTROL, 3.

Did you get your circuit breaker to gimbal ACT?

Yes, they are all set.

All right, let me check mine.

I already checked yours.

Okay.

Okay. PGNS and PGNS AUTO and AGS AUTO. Our push-
buttons are reset. A is in MIN.

How far down are we on the DPS configuration card,
now? Down to --

Here.

Down to there. Okay.

*** we're through with that card.

Okay.

Back on this one?

Roger. We've got 10 minutes.

Standing by for the landing radar.

I'm a little early here?

Fred, if you're going to give me any words on the
antenna operation, I'd appreciate them very soon.

Okay. We're going with OMNI&s. At 10 minutes,
give me circuit breaker LANDING RADAR, closed;
your ALTITUDE TRANSMITTER.
Okay. It's closed and the VELOCITY TRANSMITTER is reading 4.0, and the ALTITUDE TRANSMITTER is reading 4.0.

Okay. Let's call P63.

Let's do (humming).

*** just about 1 second off. *** on. Timer's set. It's right on.

Okay.

Okay. We're looking for NOUN 63; go ahead.

Okay, your DPS burn card is all complete.

Go ahead, Fredo.

Okay. If I hear it, I'll switch --

... call on it.

Roger. If I hear it starting to break up, I'll switch it unless you'd rather I wait for the call. Okay.

Okay, the FDAI *** 51.1 and about ***

*** looks good. We'll zero the CDUs.

Okay.

*** zeros in.

Roger. Standing by.

*** zeros complete.

Okay.

400 to plus 30000.

It's entered.

410 to plus all zeros.
04 11 54 48 LMP 410 to plus all zeros is entered.
04 11 54 50 CDR ... plus 10000.
04 11 54 52 LMP Plus 10000 is entered.
04 11 54 56 CDR ... We have needles?
04 11 54 57 LMP It went in and we have needles.
04 11 54 58 CDR You can read out 433 at your pleasure.
04 11 55 03 LMP Okay. 433, inertial velocity.
04 11 55 09 CDR Okay, we're sitting on final trim, waiting 4 minutes. *** VERB 21 NOUN 01, 1010 and 107 is your first call.
04 11 55 25 LMP Okay. *** got it there; I've got it here. Good enough.
04 11 55 45 CDR Okay. We're starting now with 96 on A and ***4 on B. *** good.
04 11 56 11 LMP Hey, Al, your RCS system looks ***
04 11 56 14 CDR ASCENT HELIUM 1 and 2 look good. B tank is still good, and the start tank is good.
04 11 56 24 LMP EPS system is good. ECS, all indications are normal.
04 11 56 29 CDR Okay.
04 11 56 31 LMP Ready.
04 11 56 35 CDR ... fortunate. A minute and 50 seconds away from final trim.
04 11 56 41 LMP Okay. ***
04 11 57 04 CDR Okay. We'll go into final trim 30 seconds early. It'll allow you to get that *** - get a final trim and then you can take it over.
04 11 57 22 LMP Okay. ***
Rather have me put it in?

No. I've got it. I just wanted to adjust this lock -- locking harness *** can still reach ***

Oh?

*** out of there.

*** we're there, and we are.

Ok*** you ready?

I'm ready, ENTER.

ENTER.

Sure hope this thing comes up. And there it is.

NOUN 62 VERB 21 NOUN 01, ENTER; 2010, ENTER; 207, ENTER.

2010, ENTER; 207, ENTER.

Okay, Houston. It's in.

And Antares is standing by for a PDI GO.

Good show, Fredo. Thank you.

Thank you; you troops did a nice job down there.

That was beautiful.

If your watch is reset, we'll flip the page.

Okay. Let's go.

Okay. All procedures are normal from here on in, except at 26, I actuate the manual throttle to full on my side.

That's correct. I'll start reentering the - that's after you have throttled up.

Okay.
Won't have guidance until after I give it to you - after the first ***kay. Have we covered everything on that last one?

Yes, sir.

At 10 feet per second, we ***

You're breaking up to me. Would you run your SENSITIVITY up a little?

Okay. SENS - VOX SENSITIVITY is full up.

Okay.

It's a beautiful day to land at Fra Mauro.

*** MASTER ARM, ON, 30 seconds *** hit us again. Houston, the MASTER ARM is ON, and the A and B lights are on.

*** quiet. Looks good.

MARK, 1 minute.

Okay. LANDING RADAR TEMPERATURE's coming up. Okay.

We get the - the PRO?

Yes.

... SENSITIVITY got bumped.

Okay. Our DSKY's on time.

... lights.

ARM to DESCENT.

Average g is on. The descent engine is armed.

And VELOCITY light?

There's ALTITUDE and VELOCITY light. R₃ looks quiet.

Okay, we're waiting for ullage - auto ullage.
04 12 02 16  CDR  R₃ looks good.
04 12 02 19  CDR/LMP  Ullage -  
04 12 02 20  CDR  Auto ullage - 
04 12 02 25  CDR  PRO 4, 3, 2, 1, 0 -  
04 12 02 27  LMP  IGNITION.  
04 12 02 28  CDR  We have auto ignition.  
04 12 02 30  LMP  Okay, that - Good - good ignition.  
04 12 02 33  CDR  We have an auto ignition.  
04 12 02 37  LMP  Okay. ENGINE ARM OVERRIDE - ENGINE COMMAND OVERRIDE.  
04 12 02 39  CDR  Okay. And the MASTER ARM is OFF.  
04 12 02 41  LMP  All right. Standing by for 26.  
04 12 02 43  CDR  Okay. Let's take the throttle up at 26.  
04 12 02 52  LMP  *** up.  
04 12 02 54  CDR  Okay. We're at full throttle, Houston.  
04 12 02 56  LMP  The command is down. VERB 25 NOUN 7 *** 101. 
04 12 03 07  CDR  1.7.  
04 12 03 10  LMP  *** ENTER; *** guidance. And you have commanded throttle.  
04 12 03 17  CDR  Okay. We have guidance.  
04 12 03 21  LMP  All right. I am disabling. VERB 25 NOUN 7 ENTER,  
105 ENTER, 400 ENTER, ... ENTER. Okay, LANDING RADAR, ENABLE. VERB 21 NOUN 1 ENTER, 1010 ENTER,  
77 ENTER. The landing radar is there. Al, you can reduce your throttle to minimum. You have - - 
04 12 03 54  CDR  Okay. Coming down. 
04 12 03 55  LMP  --- commanded thrust both ways. Houston, the procedure is complete. 

...
And we're standing by for NOUN - and we're standing by for NOUN 69, as appropriate. Okay. I guess things are back to normal now, huh?

Yes. Let's get off --

Plus --

02 - no, 10 plus 02800.

Okay, Houston, how does that look? You say it's in?

Okay, give me a 2-minute-and-30-second hack, Al.

... mark.

2:30. And we're a little fast. About 10 feet per second. ... slow on H-dot, a little low. PNGS and AGS are within 2 foot per second. It looks good. It looks good.

Okay, it's almost back on the track.

Yes. Give it a 3-minute mark, again.

All right.

MARK; 3.

MARK; 3. The - V is good.

Okay; understand. GO at 3.

H-dot is low. H is a little low. PNGS and AGS, *** foot-per-second difference.

Okay. Still high on the AGS at the moment. Hey, do you want to get those ED BATs out of the way?

No, I was going to wait and give them another 10 seconds here.

*** the throttle convergence.

Take a look at ED BATs.

Okay, the throttle's converging. Looks nice.
Day 5

04 12 06 12 LMP

Houston, my ED BATs are GO. All in the Green. *** that smooth ride.

04 12 06 23 CDR

Yes, it's great. Guidance is good. Roger.

04 12 06 31 LMP

*** V\textsubscript{I} is good. H-dot still low. H is converging. PGNS and AGS about 2 and a half foot apart. And at 32,000, we should be getting landing radar in very soon. Good. They're GO. And I will give an update at 12,000; there's little difference in them. Come on, radar; that's a lockon *** radar *** thousand *** have anything to get the radar in?

04 12 07 37 CDR

Roger.

04 12 08 00 LMP

05:30. Still on profile. PGNS and AGS are about 4 foot apart, now.

04 12 08 13 CDR

Roger.

04 12 08 14 LMP

Roger, Houston. We still have altitude and velocity lights.

04 12 08 22 CDR

I'll bet they ... know that. Stand by for 6.

04 12 08 30 CDR

MARK; 6.

04 12 08 31 LMP

Six. V\textsubscript{I} is good. H-dot is low. H is high, now; we're running high on H. PGNS and AGS are together.

04 12 08 40 CDR

Okay.

04 12 08 47 LMP

Cycle the LANDING RADAR breaker.

04 12 08 50 CDR

Okay. It's cycled.

04 12 09 02 LMP

Come on.

04 12 09 12 CDR

Velocity light. VERB 57 ENTER. How does it look, Houston?

04 12 09 25 LMP

*** to accept?

04 12 09 31 CDR

Okay, PRO; ..., PRO. Great. Great. Whew, that was close.
Okay, I'll give you 07:30 mark, Al.

... running.

Okay, the throttledown was on time, essentially. And we're on DESCENT FUEL 2.

Okay. Thank you. ... PGNS. You leave these - leave that up?

150; 13000. Roger. PGNS - AGS is updated. Okay, everything is looking good, Al. I'm starting the camera.

*** seconds to go.

How much?

*** seconds to go.

Okay, there's pitchover.

64; and we have pitchover, Houston.

There's PRO. You have it?

There's Cone Crater.

Right on the money.

And there it is!

Right on the money!

Hot damn! Right on the money!

What's the LPD, babe?

LPD, 41.

Okay. Fat - fat as a goose.

41.

Beautiful.

Right out the window. Just like it should be.
Outstanding!

Great!

Okay, let's get in - back inside.

Okay. Here we go.

...

Thank you, sir.

3000.

Up next.

You're out at 3000, Al. Seventy-five feet a second.

Okay. That LPD is real good.

Houston, I'm on AFT. *** 2000, 48 feet --

One click left.

A little fast.

One click left.

2000 feet a second. A little bit fast but not bad.

Okay. Outstanding.

Okay. 1500; too fast. Not bad. Coming in well. LPD's 40, Al. Going through a 1000 feet; 87 feet. Right on schedule. Right on schedule, now. Going by Cone Crater right outside to my right.

Okay, the best spot is - oh, south of track about halfway between Triplet and Doublet. Go south of track.

Okay.

About 60 meters. That's where we're going.

That looks good from here. Looks good from here. Okay, Al, you're through 550 feet.
04 12 12 52  CDR  Okay.

04 12 12 54  LMP  Sixteen feet per second. 500 feet, 15 feet per second. It looks good. The fuel is good at 10 percent.

04 12 13 03  CDR  Let's take it over and move up a little.

04 12 13 05  LMP  Okay. Yes, I think so. You're through 340 feet.

04 12 13 08  CDR  I'm ATT HOLD.

04 12 13 09  LMP  Okay. I'd give - give it few clicks. You're through 200 feet - -

04 12 13 12  CDR  Okay -- 5 feet per second. That looks good.

04 12 13 22  CDR  ... level here.

04 12 13 24  LMP  Nine percent fuel; looks great. Okay, looks like you're going right over the middle of Triplet. 170 feet, Al. Two feet per second down. Eight percent fuel. You're looking good.

04 12 13 41  CDR  Okay.

04 12 13 42  LMP  170 feet and holding. About 1 foot per second down. Ought to pick - speed it up a little bit.

04 12 13 48  CDR  Stand by to move forward.

04 12 13 50  LMP  Okay. Seven percent fuel, and you're still at 170 feet indicated.

04 12 14 04  CDR  Heading down.

04 12 14 06  LMP  Okay, you can move on over. You're just barely crossing North Triplet, barely crossing North Triplet. Six percent fuel. Okay, 150 feet. There's DESCENT QUANTITY light.

04 12 14 10  CDR  Okay.

04 12 14 25  LMP  All right. And you can land over here. There's some dust, Al. 110 feet. Three feet per second down. You're looking great.
04 12 14 28  CDR  What percent?
04 12 14 29  LMP  Six percent. There's good dust. On your own at - ...
04 12 14 39  CDR  Starting down. Starting down.
04 12 14 41  LMP  Okay. There's 90 feet; 12 feet per second; 5 feet per second down.
04 12 14 47  CDR  Okay.
04 12 14 48  LMP  ... down; looking great. Looking good. ...
04 12 14 50  CDR  Okay. Fifty feet down; 50 feet.
04 12 14 53  LMP  We're in good shape, troops.
04 12 14 56  CDR  Three feet per second; 40 feet, 2 feet per second; 30.2 *** feet per second; looking great; 20 feet; 10; 2 feet per second.
04 12 15 09  LMP  CONTACT, Al.
04 12 15 10  CDR  *** stop. Great. Oh, AUTO, AUTO.
04 12 15 16  LMP  We're on the surface.
04 12 15 17  CDR  Okay. We made a good landing.
04 12 15 22  LMP  013, plus 10000. That was a beautiful one.
04 12 15 25  CDR  Okay, we're slightly off. Kind of a slope, but other than that, we're in great shape; right on the landing site.
04 12 15 34  LMP  Okay. Recycling the Parker valves. Okay. Closed, open, closed, open, open, open, open.
04 12 15 47  CDR  ... HELIUM, REG 1, CLOSED. Talkback barber pole; and the OXIDIZER and FUEL VENTS are gray; MASTER ARM is ON; DES *** VENT, FIRE.
04 12 15 55  LMP  Okay. MASTER ARM.
04 12 15 59  CDR  ARM is OFF.
04 12 16 00  LMP  Okay.
And they are coming down.

They're coming down.

Okay.

PROPELLANT TEMP/PRESS MONITOR ... ASCENT then DESCENT.

Okay. ASCENT ... good; DESCENT 1 ... Okay, we're coming down on both.

Okay. ASCENT HELIUM MONITOR cycle. ... monitor.

Okay. ASCENT HELIUM 2; okay.

Roger; thank you.

ASCENT HELIUM 2 looks good. ASCENT HELIUM 1 looks good.

Okay. Okay, O₂ QUANTITY MONITOR. I'll take a look at those --

Take a look at those babies.

Okay, just like they did in orbit. ASCENT 2 is full. $$$ to DESCENT. All right. And the sequence camera is off.

Okay, VHF A TRANSMITTER to VOICE. STAY for T₁. So, I'll do a 414 --

Four, plus 20000.

$$ thousand and, oh, fourteen - 400 plus 4.

400 plus 40000.

014. Did I get that right? Houston, did I get a 414 plus 20000 in?

Okay, 0.01.

Okay.

Okay, you're in NOUN 43s, Houston.
Yes, we are on a little slope, aren't we?

Yes. That's the flattest place around here, though.

What's that, about 8 degrees of roll we're in? An 8-degree slope.

Let me copy those down. ..., Back on our book.

*** reset.

NOUN 40 - Hold it. No, you blew it up before I got a chance --

Minus 367.

Pardon?

Minus 367, minus 1751.

367. One, what?

1751.

What was the altitude read-out? ...

You want to give me the - everything from P12, please? ...

Okay. \( T_2 \), 109.

Plus 109.

***04.

Plus 04.

Plus 34.06.

34.06. I have 109:04:34.06.

That looks good.

Okay. How about how my NOUN 76?

Okay, that's good. Let's go - go with the pad value, 55124.
Okay, VERB 25 ENTER, plus 55124; plus *** ENTER; *** ENTER.

Okay.

Okay.

Oh, wait a minute. Now, Houston, how do you like the AGS alinement? Should we go ahead and update the state vector or stay with what we have?

Okay. Go as is. 411 plus 10000.

...

***11, plus 10000.

Right.

410, plus zeros.

DESCENT HELIUM - DESCENT OXIDIZER is about --

Roger, Roger. Thank you.

Okay STAY for T₂. TAPE RECORDER, OFF.
EVA-1 PLSS COMMUNICATIONS TO POST-EVA-1

04 16 27 23 CDR *** EVA.
04 16 27 24 LMP VHF ANTENNA, EVA.
04 16 27 26 CDR FUNCTION, ENABLE.
04 16 27 33 LMP Okay.
04 16 27 34 CDR FUNCTION, ENABLE.
04 16 27 36 LMP ENABLE.
04 16 27 37 CDR Okay. You collect - or connect to the PLSS comm ... AUDIO circuit breakers, here.
04 16 27 43 LMP Okay.
04 16 36 45 LMP Houston, this is Ed on Antares. How do you read?
04 16 36 58 CDR Okay. I can't - I can't hack this. My VHF switch is OFF.
04 16 37 02 LMP Pardon?
04 16 37 04 CDR My VHF switches are both OFF.
04 16 37 07 LMP What do you mean, your VHF switches are both OFF?
04 16 37 11 CDR They're both OFF ...
04 16 37 12 LMP You're coming through my side.
04 16 37 21 LMP Houston, this is Antares. How do you read?
04 16 37 49 LMP Houston, Antares. Over.
04 16 37 55 CDR VHF ANTENNA ... Okay.
04 16 38 09 LMP Houston, this is Antares. Over.
04 16 38 15 CDR Go ahead, VHF ...
04 16 38 17 CC Antares, this is Houston. Go ahead.
Okay, Bruce, I have you. We seem to have lost comm on the PLSSs. Let's get coordinated and try through it again. Over.

Roger.

What do you suggest? We went through the checklist, and when we gave you a call; no response. Were you reading us at all?

We were receiving data, but we did not read you on board. What is your present configuration?

Well, I've come off of the PLSS comm and back on to the ship's comm. Al is still set up with his PLSS operating, and --

... reading?

He's not reading at the moment, but he shouldn't be. And we can talk with each other in A, B, and AR.

Okay, I understand. You can talk to each other in A, B, and AR in the LM. The last word that I had from you - was when you reported 92 percent oxygen; and I believe, at that time, you were in mode A.

And Al was still on the ship's comm.

Okay. Let's see if that's correct.

Is Al in mode A at the present time?

No. He's in AR at the present time, still.

You're right, Bruce. That's the last time you should have heard me, I guess - is - that's the last time you heard me was at that point, and I was on A.

Okay. We should have heard you subsequent to that, but that is the last time that we heard you. And stand by; we'll have some procedures for you in a minute.

Okay. Sounds like it's your comm that's - The C - C transceiver that might be the problem. That's the one that sends it on out to Houston.
04 16 40 28 CDR Yours went through A, huh?

04 16 40 31 LMP Yes, we can talk to each other fine. And they're getting - well, wait though - They're - they're getting data from us, they said.

04 16 40 58 CC Ed, this is Houston. We request that you return to the beginning of the PLSS comm check block, indicated at 18 minutes on the EVA-1 card, and...
Houston, this is Ed. Loud and clear.

Okay. Got you in FM. We're presently receiving no data in FM. Let's press on to CDR's AUDIO panel.

Okay. TV, closed. Okay. S-BAND T/R; ICS T/R.

Wait a minute. I'll reverify it. Okay. S-BAND T/R.

ICS T/R.

ICS T/R.

RELAY OFF.

RELAY OFF.

MODE, VOX.

MODE, VOX.

VOX SENS, max.

VOX SENS, max.

VHF A, T/R.

VHF A, go ahead, T/R.

VHF B, RECEIVE.

VHF B, RECEIVE.

Okay. All right, Houston; we've verified the AUDIO - CDR's AUDIO panel.

Okay. LMP's AUDIO panel.

T/R; RELAY ON. VOX - VOX SENS, max; T/R. Okay, Houston, how do you read, now? Houston, Ed; how do you read?

Ed, this is Houston. Over.

Okay, Houston, reading you loud and clear. How me?
Houston, this is Antares; reading you loud and clear. How me?

Antares, Antares, this is Houston. Over.

Okay, let me go back and reset the switches. Houston, this is Ed. How do you read, now?

Okay, Bruce, it seems like I lost you when I went to RELAY ON on my panel. I guess that's appropriate, since I'm still on Antares' comm, is it not? *** Yes, but I don't - what he said when he - when the static came on the line. Before I went to RELAY. No, with RELAY ON, I was not reading him. I'm on ship's comm, so I shouldn't.

Okay, Houston, how do you read now? Okay.

Go ahead.

Okay. You wanted me to change the MODULATE switch to PM? Is that affirm?

Okay. I'm at the point now of going back to the LMP's AUDIO panel. I will not transmit again until I get on PLSS comm. Over.

Got you. I'm holding. And, Houston, Al can read you part of the time and not part of the time. I think it's because the relay's off over here, right now. ...

Okay, Bruce. I think it has to do with the RELAY switch, as well. Let's ignore that and go on for the moment. ... of my keying.

Houston, Antares.

I think a lot of this noise is coming when I hit my - It seems simultaneous with my keying my umbilical.

Okay, maybe it's only ... to us.

I don't know what it is. They're trying to figure out what is wrong with our comm. They won't let me go on until they - this is ...
Okay, you're verifying your own configuration, is that affirm?

Put your - put your antenna down before you break it off.

... looks great. Put it any place. *** Right now, we are only 20 minutes behind time.

Go ahead.

Okay. Stand by. Let me verify his configuration. Okay. You should be in AR. Okay, you're in AR. They are going to call you. Okay, Bruce. On my mark, I will go to RELAY ON and stand by for your call. In 20 or 30 seconds, I'll come back, if no comm. 3, 2, 1.

MARK. They're going to call you.

Antares, Antares, this is Houston calling Al. Do you read? Over.

Al, Al, this is Houston. Do you read? Over.

Antares, this is Houston. Do you read? Over.

Houston, Antares. Read you loud and clear. How me?

Antares, this is Houston. Do you read? Over.

Houston, Antares. Loud and clear. How me?

Antares, this is Houston. Do you read? Over.

Okay - Bruce. This is Ed. We both read you loud and clear. Al called back but you could apparently not read him.

Okay. What? That's probably the next thing we'll try. However, the RELAY switch must be working, if - you were reading him. (Cough) Houston, one minor suggestion: remember we have been in SECONDARY TRANSMITTER/RECEIVER since before PDI, and I don't know that we've ever established that our PRIMARY is good or not good.
04 16 54 45 LMP *** were you in VOX mode, for sure? That's a verify. He was in VOX mode, and I was reading his calls.

04 16 55 29 LMP *** It didn't look that big when we came over it.

04 16 56 16 LMP Go ahead, Bruce.

04 16 56 50 LMP Okay, we've got it. We'll reverse the LMP and the CDR's AUDIO panels.

04 16 57 03 LMP No, I'm still on LM comm.

04 16 57 19 LMP Bruce, don't you want to try communicating with Al, just with his RELAY ON, before I can do anything else?

04 16 57 49 LMP Okay. Will do. Okay, Al. Set yours - T/R - T/R, RELAY ON. ..., RELAY ON.

04 16 57 59 CDR ON.

04 16 58 01 LMP MODE, VOX.

04 16 58 02 CDR MODE, VOX.

04 16 58 03 LMP VHF A, T/R; B, RECEIVE.

04 16 58 05 CDR VHF A, T/R; B, RECEIVE.

04 16 58 09 LMP Okay, and mine's going T/R, T/R, RELAY OFF; VOX - VOX in; A, T/R; B, RECEIVE. Okay. ... give them a call.

04 16 58 27 CDR Houston, this is Al. How do you read?

04 16 58 39 CDR Houston, this is Al. How do you read?

04 16 58 40 LMP They're reading you.

04 16 58 47 CDR They're reading me, but I'm not reading them?

04 16 58 57 LMP Houston, that's affirmative. Alfa and Bravo are OFF. I am reading you. Al does not seem to be. Give him another call.
Okay, Houston, this is Al. Testing, 1, 2, 3, 4, 5, 4, 3, 2, 1.

*** with your VOLUME control?

Okay, Bruce, give him a long count and let him --

Al, this is Houston. Reading you loud and clear.

-- give him a long count and let him try to adjust his volume and see if that's part of it.

... getting him now?

Okay. Turn maximum, up. *** wheel.

Both of them are turned to max volume, and I can't hear anything.

Okay. Houston, he had full volume up and is not receiving you.

Do you read me, Al? Or are you hearing me through here? Okay, he is not reading me. We're just talking in the cockpit.

... audio.

... read you.

Go ahead.

Comm in AR.

I'm in AR.

You're verified.

OFF and back in AR.

You've already cycled that wheel all the way, haven't you?

Yes, it's all the way -

Well, you cycled it all one way to the other?
04 17 01 13  CDR  Yes.
04 17 01 14  LMP  Houston, we've already done that, and we still
don't receive anything.
04 17 01 40  CDR  Counterclockwise is that away.
04 17 01 46  LMP  As you look at it, counterclockwise? Right? As
you'd look down on it, counterclockwise?
04 17 01 53  CDR  Yes.
04 17 02 02  LMP  Go ahead.
04 17 02 20  LMP  Okay. Say again which one you want which.
04 17 02 34  LMP  Okay. A1 in Bravo. Me in Alfa. And we will try
our comm check again.
04 17 02 47  LMP  ... Houston, for that check. Observe - Do you
still want the VHF A, VHF B, OFF, on the LMP panel?
04 17 03 12  LMP  Understand that. You're in A, T/R and B, RECEIVE,
right?
04 17 03 18  CDR  Right.
04 17 03 19  LMP  Okay. Let's - you go Bravo. I go Alfa.
04 17 03 24  CDR  Okay. But ... not even on the PLSS.
04 17 03 26  LMP  Pardon?
04 17 03 28  CDR  *** not even ***
04 17 03 31  CDR  I'm going to be in just a minute.
04 17 08 20  LMP  *** trouble. I think that circuit breaker was out.
04 17 08 31  LMP  Houston, this is Ed. How do you read?
04 17 08 37  CC  Loud and clear, Ed.
04 17 08 40  LMP  Check to make sure your AUDIO circuit breaker is in.
04 17 08 42  CDR  Okay. It's in.

CONFIDENTIAL
04 17 08 47  CC  Ed, this is Houston. Loud and clear.
04 17 08 49  LMP  ...
04 17 09 00  LMP  ... You go to B. I go to A.
04 17 09 03  CDR  I'm B.
04 17 09 06  LMP  Houston, this is Ed. How do you read?
04 17 09 07  CC  Ed, this is Houston. Over.
04 17 09 11  LMP  Houston, this is Ed. How do you read?
04 17 09 14  CC  Ed, this is Houston. Loud and clear.
04 17 09 17  CDR  This is Al. How do you read?
04 17 09 20  LMP  Okay. Let's try once more.
04 17 09 23  CC  Al, this is Houston. Al, this is Houston. If you're in mode B, I shouldn't - You shouldn't be able to read me, but I'm reading you loud and clear.
04 17 09 29  LMP  Let's go to AR, now.
04 17 09 30  CDR  Let's go to AR. Reconfigure the panel *** Okay? Let's put your RELAY ON.
04 17 09 37  LMP  No, no leave it - leave it right where it is. We were fine. Don't touch a thing.
04 17 09 40  CDR  Okay.
04 17 09 41  LMP  Houston, this is Ed. How do you read?
04 17 09 47  CC  Ed, this is Houston. Loud and clear. How me? Over.
04 17 09 49  LMP  Roger. Loud and clear. Try Al.
04 17 09 52  CDR  This is Al. How do you read, Houston?
04 17 09 56  CC  Al, this is Houston. Loud and clear. How me? Over.
04 17 10 00  CDR  Loud and clear.
Okay. I think we got out --

Hey, beautiful.

I think we got our problem solved.

Okay. The word from down here is don't touch a thing.

Yes, we're in good shape. We're just going to leave it right where it is.

Okay.

Okay. Where are we in the great scheme of things?

Okay.

Right in through here.

We've done all our comm checks.

All right. Okay. We're - we're still in FM, are we not?

Yes. We want to stay in FM.

Okay.

Circuit breakers in.

Okay.

Final systems prep.

Okay. I'll read out for you. Panel 16, CABIN REPRESS, verified closed, circuit breakers.

Okay. Go again.

Verify CABIN REPRESS breaker is closed.

Okay.

SUIT FAN DELTA-P, open.

SUIT FAN DELTA-P, open.
04 17 11 10  CDR  SUIT FAN 2, open.
04 17 11 12  LMP  SUIT FAN 2, open.
04 17 11 13  CDR  Okay, let's select SUIT FAN 2; I'll get it.
04 17 11 16  LMP  Okay.
04 17 11 17  CDR  And we got a MASTER ALARM.  
04 17 11 22  LMP  
04 17 11 23  CDR  Is the WATER SEP COMP light on?
04 17 11 25  LMP  It'll take a few minutes.
04 17 11 26  CDR  Why don't you check and see if it's on?
04 17 11 33  LMP  No, it's not on yet.
04 17 11 34  CDR  Okay, it must be -
04 17 11 38  LMP  Just take a little while for it to run down.  Six or 7 minutes.
04 17 11 41  CDR  Okay - Okay.  SUIT GAS DIVERTER, PULL-EGRESS.
04 17 11 47  LMP  Okay.  PULL-EGRESS.
04 17 11 51  CDR  CABIN GAS RETURN, EGRESS; CIRCUIT RELIEF, AUTO. Verify. I'll get them.
04 17 11 55  LMP  Okay.
04 17 11 57  CDR  RELIEF, AUTO.
04 17 12 00  LMP  Stand by.
04 17 12 04  CDR  CABIN GAS RETURN is EGRESS.  Okay.  Ready for the OPS hookup.
04 17 12 12  LMP  Okay.  OPS hookup.
04 17 12 16  CDR  Go on, you first.
04 17 12 17  LMP  Okay.
Unstow the $O_2$ actuator, if you'll bend over a little bit.  ...  

No - Yes, it's on backup again. I'll put it down for you. Okay.  ...  get it to me?  

... there we go.  

Uh-oh!  

Snapped up nice and clean on top.  

Okay, $O_2$ actuators unstowed and - Actuator to RCU.  

Okay. It is.  

Okay.  

Okay. SUIT ISOLATION, DISCONNECT. And disconnect the LM hoses.  

Okay, I'm hung up here on something.  

Okay.  

Let me get your antenna down before you break it.  ...  afraid of that.  

Okay, your LM hoses are off. And we'll let them hang down there.  

Okay.  

Okay. OPS $O_2$ hose to PGA.  

Okay.  

*** MASTER ALARM. Okay, that's the ECS system.  

Right.  

Okay. That's the $O_2$ ... $H_2O$ COMP light.  

Try it again. That bulky one.  

Okay, there it is. And you need the purge valve.
Okay, purge valve.

Okay, we've got the purge valve; it's closed, locked, and trimmed; and we're on low flow. Okay.

Do you know where this thing ends up?

Yes. ... back locked.

Okay. Locked and LO ... PGA diverter valves to - valves to vertical. And repeat with thee.

Okay. And, let's see, where was that? That's right there.

Right there.

Ed, this is Houston.

Go ahead, Houston.

We'd like to ensure that you reset the MASTER ALARM from the WATER SEP, and we'd like you to verify which panel is your RELAY mode ON. Over.

Your valve was loose. It came up - Stand by, Houston.

Turn it on.

Yes, but it - it hung up on the cover when it came up. It's still loose. Okay, that's --

Okay, the MASTER ALARM has been reset, Houston.

Okay.

Okay, Al. Which AUDIO panel has the RELAY switch ON? Over.

CDR's.

Better stay that way because we've got a problem over --

Roger. Out.
-- on that one. We do have two problems. The first one was right there - was that one; the second one was the other - was the cockpit error.

Okay.

Okay.

Ready; let's connect these babies.

Okay.

(Yawn) Okay. Connect the OPS O₂ hose.

Okay. OPS O₂.

PGA, blue to blue.

And we have a purge valve.

Okay.

Lock, locked and verify LO. LO? Okay.

Got LO. Okay. See where the apple is?

Okay?

Okay.

...

Okay, get your DIVERTER valves vertical.

They are.

Okay. Great.

... champagne!

(Laughter) Yes. All right.

I think they put champagne instead of iodine in the LM water this time. Okay.

Okay. Position the mikes. ... closed.

Okay. Right down here. Both mikes are repositioned.
Okay. PLSS --

FAN, ON.

... get my helmet ... damn it.

Okay?

Okay. PLSS FAN, on. Right vent flag - right vent flag, cleared.

Right vent flag is cleared. Tone is stopped.

Okay, my tone is stopped. Okay. Don helmets.

Okay.

Okay. You're locked. And the LEVAs. Thank you. Is your drink bag positioned okay?

I think I got a mouth full of microphone; I can't get a drink.

You've got to put up with a few hardships.

Right, I don't mind at all.

Okay. I think that baby is about ready.

Okay, let's snap it on.

*** the drink port. Okay. I'll check my back.

Houston, this is Al. Are you following us on the checklist now?

That's affirmative, Al.

Okay.

Okay, you're ready to go out and play in the snow.

Yes, it looks like my snowsuit's ready.

Okay.

... do the same for you.
04 17 21 51  CDR  Okay.
04 17 21 56  LMP  You got your comm carrier cable like you want it?
04 17 22 00  CDR  Yes.
04 17 22 24  CDR  Okay, helmet's on.
04 17 22 26  LMP  Okay.
04 17 22 29  CDR  Bag's okay. Install LEVA (singing).
04 17 23 06  LMP  Okay. Your LEVA's on.
04 17 23 05  LMP  Get the back.
04 17 23 07  CDR  I'll get the back, just a second.
04 17 23 11  LMP  I'll get this tucked down, right there.
04 17 23 36  LMP  Okay. Let me look back there, Al. I'm afraid to trust it without looking. Okay.
04 17 23 39  CDR  Okay. The LEVAs are both on.
04 17 23 42  LMP  Okay.
04 17 23 43  CDR  The LCG is as required.
04 17 23 46  LMP  There's somewhere we missed something. You didn't go back and do that twice.
04 17 23 54  CDR  What? The OPS connect?
04 17 23 59  LMP  Yes. We connected one, but we didn't recycle. Did we?
04 17 24 05  CDR  Yes; yes, we did.
04 17 24 06  LMP  You've still got some Irish pennants floating loose here.
04 17 24 10  CDR  This isn't installed yet.
04 17 24 12  LMP  It was installed a minute ago. Put it back on you.
Okay, it's locked now. Must not have had it locked before. Oh - No, we triggered it when we were getting your spacesuit on.

Okay.

Okay. Yes, that's good.

Okay.

Okay, we're ready to go LCG, COLD, to ...

No, leave the LCG.

Huh?

I disconnected, so let's leave the LCG control as it is.

Okay.

And we can open up the LCG PUMP circuit breaker on your circuit breaker panel. And -

Okay, the LCG PUMP is open.

Okay. You can take off your LM water hose.

And connect the PLSS water hose. And get the umbilical out the way, also.

... here to get this - Get this ...

... Lean forward a little bit, Ed. Okay. Hold it.

Okay. Got it.

Okay.

Okay. Is your water hose in?

Yes, they're all connected.

Okay. Let me read while you verify. Helmet and visor, aligned and adjusted.
Okay.
Torsó tiedown. Adjusted. Three oxygen connectors locked.

Okay.
Three oxygen connectors locked.

Okay, two, three, and lock, locked.

Okay. One purge valve, locked.

Purge valve, locked.

Check the water connector.

Locked.
Okay, and the comm connector.

It's locked.
Okay. Read for me.

Okay. Helmet and visor.

Okay, and the LEVA.

And torso tiedown.

See all your flags?
Yes.
Okay, that's locked. Okay.

Okay, O₂ connectors.

One there, red; one there, blue; locked. One there, blue, locked. Okay.

Purge valve 1.

Purge valve, on and locked.

Water connector.
Water connector is on and locked.
Comm connector.
Comm connector is on and locked.
Okay.
Okay, verify EVA circuit breaker configuration.
Okay, let's go circuit breakers.
In ...
Okay. Circuit breakers are configured here.
Okay, I verify no fog on the right-hand window. You can tie the jettison bag.
Okay.
Yes. I wish we had more room to move around.
Okay.
Okay, we can don EV gloves.
Okay. Verify your wrist locks and your glove straps. Oops, you're not on yet.
Not quite.
Strap.
No, that's the armrest.
We'll get it in a minute.
Okay. My gloves are on and the straps are adjusted.
Okay.
Okay.
Okay. Now, let's go PLSS DIVERTER to MINIMUM.
Okay. PLSS DIVERTER, up.

Verify it's MINIMUM.

MINIMUM.

Turn your PUMP, ON - that's to the right.

I'm coming ON now. Okay, I can hear it running. Feel it getting cool. PRESS REGs A and B to EGRESS. Okay, ready for PLSS, O₂, ON. PLSS, O₂, ON. Okay, O₂ flag. ... Pressure gage is coming up.

PRESS flag clear, 3.2.

O₂ flag clear, 3.7. Okay, are you ready for the 1-minute check?

I'm not reading you. Okay, try it.

Okay, do you read me now?

Yes. Okay (laughter). I was reading you.

Yes. Okay. Okay, you ready to bring PLSS O₂, OFF?

Okay, where are we?

We'll do it at 20. Coming OFF. Watch it - gage decay.

Okay. My O₂ is OFF.

Okay, Houston, we're 1 minute. Both suits are tight. PLSS O₂ is going back on, and we're standing by for CABIN DEPRESS.

Roger. Stand by, Antares.

Antares, this is Houston. You are GO for CABIN DEPRESS. Be sure and give us a mark when you start you watch --

Okay.
04 17 36 48 CC  -- at the second DEPRESS.
04 17 36 50 CDR  Okay. Circuit breaker CABIN REPRESS, open.
04 17 36 54 LMP  It's - open now.
04 17 36 59 CDR  CABIN REPRESS valve, CLOSE.
04 17 37 08 LMP  CLOSE now.
04 17 37 09 CDR  Okay. And let's take the --
04 17 37 20 LMP  No, let's get the overhead. I think it would be easier, don't you?
04 17 37 23 CDR  I can get the forward one.
04 17 37 26 LMP  Okay.
04 17 37 27 CDR  I'll go down and get that. Let me know when it's to 3.5.
04 17 37 37 LMP  Okay. I think I'm going to be in your way.
04 17 37 44 CDR  No, I'm all right.
04 17 37 45 LMP  Got it?
04 17 37 46 LMP  Okay. Drop her on down.
04 17 37 47 CDR  Really. Really.
04 17 37 50 LMP  Wait a minute. Get the latch out of the way.
04 17 37 53 CDR  I - There we go. Here we come.
04 17 38 03 LMP  Okay. Down through 4.5. Through 4.
04 17 38 10 CDR  There's 3.5.
04 17 38 11 LMP  No, not quite; bring her on down. There's 3.5 and holding.
04 17 38 21 LMP  Okay.
04 17 38 24 CDR  I've got 4.9.
04 17 38 27  LMP  4.85 and holding.
04 17 38 29  CDR  Okay.
04 17 38 30  LMP  Okay. Cabin's at 3.5.
04 17 38 33  CDR  Cabin suit circuit.
04 17 38 34  LMP  Is at 4.5.
04 17 38 37  CDR  Okay.
04 17 38 38  LMP  PGA is 4.8 and coming on down. Houston, we are ready to start our watches.
04 17 38 45  CC  Give us a mark.
04 17 38 51  CDR  Okay; 3, 2, 1 -
04 17 38 54  CDR  MARK it. We're off and running. Time zero.
04 17 38 58  LMP  Okay. Over here - let's see, FORWARD DUMP valve, OPEN now.
04 17 39 03  CDR  Okay. I'm going to dump. And there's the tone.
04 17 39 31  LMP  Tone on; water flag, A.
04 17 39 33  CDR  Water flag, A.
04 17 39 39  LMP  Five pounds pressure. *** 0.6 pounds in the cabin, *** half a pound in the cabin. You might be able to get the door open partly.
04 17 40 04  CDR  Yes.
04 17 40 06  LMP  Better let her drop a little more. It's a pretty heavy pull there.
04 17 40 17  CC  You got a lot of surface area on that hatch.
04 17 40 20  LMP  Yes. Okay, there's a quarter of a pound. Still tight, huh? Let her drop. Rest a minute. Let her drop.
04 17 40 36  LMP  Okay. It should be almost zero now.
We're showing a 10th of a pound right now.

There it comes. Okay. Final PREP. PLSS FEED - PLSS FEEDWATER.

Would you hold it for me, please?

Yes, I got it.

Thank you.

Okay -

I can get it now.

Straight - straighten up.

... There we go.

Okay. PLSS FEEDWATER, OPEN.

Okay. We're waiting for the water flag.

*** don't have the PREAMPs or the ECS caution lights.

No, they're on.

Are they?

Yes.

Oh, I see. You've got them on DIM. Okay.

Okay. ... be getting a water flag clear here in a minute.

Okay, my PGA is getting down to about usable pressure of 4.3 now. What's yours now?

Okay. Reading 4.2.

We ought to be able to work in a minute. Okay. The present warning status is good. We have a WATER SEP light, PREAMPS, ECS.
Day 5

04 17 44 50 CC
Ed, this is Houston. We're showing your feedwater pressure going up. You ought to be in business shortly.

04 17 44 55 LMP
Roger. Water pressure - water flag just cleared. That's great.

04 17 45 06 CDR
You know, it's amazing.

04 17 45 09 LMP
How's yours, Al? Your water flag about to clear?

04 17 45 11 CDR
Don't know, it's still up there. No. There, it's gone.

04 17 45 14 CC
Al's pressure is rising now; it ought to clear momentarily.

04 17 45 18 CDR
Okay, Al's water flag is clear.

04 17 45 19 LMP
Okay. Now we know what it all means.

04 17 45 22 CC
Beautiful.

04 17 45 31 CDR
Oh, hum. Okay.

04 17 45 32 LMP
Okay. LIGHTING, ANNUNCIATOR to DIM. Okay.

04 17 45 37 CDR
DIM. Stop the DET.

04 17 45 40 LMP
All right, DET is stopped.

04 17 45 43 CDR
Okay.

04 17 45 44 LMP
Forward hatch the rest of the way open.

04 17 45 47 CDR
All righty.

04 17 45 50 LMP
*** REG monitor. Okay. Forward hatch is open. Lower your visor.

04 17 46 01 LMP
Let me get a - get a -

04 17 46 03 CDR
Yes. Let me -

04 17 46 07 LMP
04 17 46 26  CDR  We're on the way now. About ready? Okay, very good.

04 17 46 30  LMP  I'll get your antenna as you go out.

04 17 46 33  CDR  All righty. Starting out the door.

04 17 46 50  LMP  You're going to have to get your PLSS down a little; roll toward me.

04 17 46 55  CDF  Okay, coming over.

04 17 46 56  LMP  There you go. Now you're clear. Your head down as soon as you can. Back right on out. That's great. Wait a minute, let me get your antenna; hold it.

04 17 47 07  CDR  Okay.

04 17 47 08  LMP  You'll have to get mine when I come out. Okay. You're clear. Go on out.

04 17 47 23  CDR  Okay, clear of the hatch. Give me a jettison bag.

04 17 47 32  LMP  Roger. Let me get over here on the other side, so I can get to it.

04 17 47 46  LMP  Oops.

04 17 48 05  LMP  I'm hung up on something, Al.

04 17 48 17  CDR  Probably that -

04 17 48 19  LMP  It's the door handle. I got it loose now.

04 17 48 21  CDR  Okay, very good.

04 17 48 33  LMP  Okay, jettison bag coming at you.

04 17 48 36  CDR  Okay. Okay, I've got it now. Standing by for the LEC.

04 17 48 48  LMP  Okay.
Okay, Houston. While he's working on the LEC, let me comment that it certainly is a stark place here at Fra Mauro. I think it's made all the more stark by the fact that the sky is completely black.

Roger.

Okay, I have the conveyor now. Have the bag. And it's deployed. And standing by to deploy the MESA. And the MESA has released - MESA has released properly, Houston.

Starting down the ladder.

Roger, Al.

Okay, Al; beautiful. We can see you coming down the ladder right now. It looks like you're about on the bottom step. On the surface.

Okay, you're right. Al is on the surface. And it's been a long way, but we're here. And I can see the reason we have a tilt is because we landed on the slope. The landing gear struts appear to be about evenly depressed.

I'm moving around, getting familiar --

Roger, Al.

-- getting familiar with the surface. The surface on which the forward footpad landed is extremely soft. As a matter of fact, it's in a small depression. The - the soil is so soft that it comes up all the way to the top of the footpad; it even folded over the sides to some degree. The same is true of the plus-Y strut.

Okay, we'll move on over. Take a look at Fra Mauro. I - take a look at Cone Crater, I should say, which is right where it should be, and is a very impressive sight. You can see the boulders near the rim as --

Antares, this is Houston. You are GO for two-man EVA. Over.
Roger, Hou - Houston. Thank you.

And, continuing, we can see the boulders that are on the rim. It looks as though we have a good traverse route up to the top of Cone. I can see Cone Ridge going along to the north. That's very apparent.

I'm moving over to adjust the MESA.

Roger, Al.

And, Houston, I'm finishing up my circuit breaker check. Will be ready to go out shortly.

Roger, Ed.

Okay, the MESA is adjusted. Going over to remove the MET blanket.

Okay, Al. I'm starting out.

Okay.

Okay, Ed. We can see you coming down the ladder, now.

And it's very great to be coming down.

Roger. Bottom step.

The last one is a long one.

Ascent check. Very easy to do. A little push and just spring right up.

We got there with those lightweight units.

Yes. Sure glad they did, too. That's great.

Al, this is Houston. Have you released the MET, yet? Over.

He's releasing it now.

Okay, Houston. The MET is finally clear of the MESA.
Al, I'm going to come over. How about getting my antenna out before I lose comm here in a minute?

Okay.

If I go around the corner or something.

Okay. Just drop this baby over here.

Okay.

It's bright up-Sun, isn't it?

Okay. If you'll stop here a minute, I'll get your antenna out. Stand by 1. Okay, you're now deployed. Okay.

Thank you.

Okay, Houston, the MESA has been stowed on the plus-Y footpad.

Roger. Out.

I'm going back to adjust the MESA.

Mobility is - very great under this crushing one-sixth-g load, Houston.

Roger.

And looking at Cone Crater, where Al was looking a short time ago, it doesn't appear there is going to be any trouble getting the MET up Cone Crater.

The backup crew copies.

I knew they would.

We knew the troops on the ground would be glad to hear that.

The MESA blanket is coming off here.
Here comes the lens cap.

You'll lose television for a moment.

Roger. MESA blanket.

Okay. That's beautiful.

Okay, senor.

Let me give you a hand, and we'll get it done.

Okay.

Put this back on?

Ed, ***

Great.

Okay, the lens cap is going on now, Houston, while we set up the tripod - move the TV to another location.

Antares, this is Houston. Request EMU status check here.

Okay, Houston. LMP is 3.75 psi; reading - 85 85 percent; all flags GO. On --

MIN cooling?

MIN cooling.

Okay, CDR here is 81 percent.

And, Al --

CDR is 81 percent; 3.75, no flags, MIN cooling.

Roger. Out. You're looking good down here.

And, Houston, while Al's getting that television, I'll go ahead and get my contingency sample; get it out of the way.
Roger, Ed.

Houston, the contingency sample is being taken about 25 feet to the - in the 01:00 position of the LM, adjacent to a - about a 5-foot crater. I'll identify it for you later.

Roger, Out.

Do you want to watch the cable as we go out, Ed?

Okay.

Al, this is Houston. Would you verify the lens is still capped? Over.

That's affirmative.

Keep going.

Okay. It's about 50 feet, I'd say.

Why don't we get all the cable out while we're at it?

Okay. Go ahead and pull it out, and I'll -

Okay. Let me get this contingency sample folded up.

Okay, Houston, the lens cap is off. We're aiming for the general area of MESA.

Al, can you pull this - the rest of this cable out away from the MESA here?

And we got about ... foot zoom. How does that look?

Okay. I think you can zoom in a little more. Let's try 40 here.

Okay. And, on the f-stop, Al, we'd like to stop it down one additional stop. That's toward the higher numbers.

Okay. It's going from 22 to 44, and I'll zoom it in to 40. Stand by.
Okay. Hold the zoom there, and the position looks good, also.

Okay, how about the f-stop?

Is the f-stop satisfactory, Houston?

Al, this is Houston. See if you can stop it down a little more. Run it up - run the diaphragm ring up against the stop there. It's still a little bright.

Okay. It's right up against the stop.

It's up against the stop, Houston.

Roger. Stand by. Al, this is Houston. Request you go to peak control.

Okay. Going to peak. Satisfactory?

Okay, Al. Now, we'd like to open it up to f/22.

Okay, this is the - the adjustment to f/22. There you go.

Al, this is Houston. Would you confirm that you're at f/22 now?

Okay, I'm confirming that I'm in peak and that I'm at f/22.

And, while we're waiting for the television adjustments, the 02:30 position, approximately 50 feet where the camera is, is slightly uphill. We see that the LM did, in fact, land on the - sort of a - a downslope. It appears to be in - almost a basin.

Al, this is Houston.

Go ahead.

Roger, Al; this is Houston. We'd like to go back to average and f/44; stop it down all the way, and then leave it there.
Okay, this is the last adjustment. Going to f/44. And going --

And going -- -- and going to average. And back the zoom out to 35. How does that look?

Beautiful.

Okay, pressing on. S-band antenna --

Again continuing -- continuing; the soil is very fine here -- very fine grain; and, as we mentioned before, there is -- there are very few samples that -- of any size at all. Mostly hand-sample size, and stacks of generally under 2 inches or less.

Roger. Houston, as you can see, the SRC table is deployed. BB is emptied, and I'm putting the LiOH canisters in it now.

Roger, Ed. And you did leave the contingency sample on the ladder?

That's affirmative. That's where it is.

Houston, it looks as though we've landed in a fairly rough place.

Yes; indeed it does. Evidenced by the fact that you dug your front landing gear into a hole.

And, Houston, I have the SWC out and setting out to deploy it.

Roger, Ed.

Am I still in your field of view, Houston?

Affirmative.

Okay.
04 18 12 40 CDR  Okay, Al is bringing the S-band antenna around. Positioning.

04 18 12 46 CC  Roger, Al; we're watching you.

04 18 13 39 LMP  And, Houston, the SWC's in place.

04 18 13 44 CC  Roger, Ed. That's 114 plus 53 plus 48 GET. SWC.

04 18 14 45 LMP  And, Houston, the LR cubed is coming off.

04 18 14 50 CC  Roger, Ed.

04 18 15 58 CC  Al, this is Houston. If you would, give us the commentary on how the legs go into the surface.

04 18 16 08 CDR  Okay, the legs are in the surface approximately 1 inch, I would say. Appear to be fairly equal all the way around - perhaps the leg to the left is in an inch and a half.

04 18 16 41 CC  Roger. We were driving more at force penetration. And did you meet any rocks or anything like that?

04 18 16 49 CDR  I didn't attempt to run any kind of an experiment - forcing the legs down. I just - just --

04 18 16 54 CC  Roger, I copy.

04 18 17 17 LMP  And here comes the S-band antenna cable. Al, you're too far away.

04 18 17 24 CC  Looks more like a kangaroo.

04 18 17 25 LMP  It should have more cable than that. It's hung up.

04 18 17 41 CDR  Okay. How are we in respect to the cable?

04 18 17 45 LMP  I'm afraid you're too far away.

04 18 17 49 CDR  Well, I wanted to get maximum length. I'm moving on in.

04 18 17 53 LMP  That's better. Let's see. Yes, I want to do that, too.
This is all she - I've got, Al.

Okay, we'll bring it in.

Right over here. Right about in here anywhere will probably do it.

We'll have to put it right here to get it level.

Okay.

Okay. Can you reach that?

Oh, yes.

Okay. If you want to stand clear, we'll deploy the antenna.

Let her rip.

Okay, here we go.

It's hung up at the top.

Yes. If you'll tilt it over toward me without dropping it, I'll get it unhung for you.

All righty. Ready for it?

All right. Lower it on down.

Okay.

Keep coming. Okay, set her up.

Okay. All kinds of freebies in today's simulators.

Roger. We got the boys in the backroom working overtime.

Sure have.

Okay.
04 18 19 57 LMP  Sure you got it?
04 18 20 02 CDR  Appears to be.
04 18 20 04 LMP  Okay.
04 18 20 32 LMP  Okay. There is Earth, way up there.
04 18 20 38 CDR  How does that look ... --
04 18 20 40 LMP  Looks like it's getting close. Let me get on the glass.
04 18 20 43 CDR  Take that - turn it to the left a little more. Wait a minute, because that changes the whole deal.
04 18 20 58 LMP  ... step over here.
04 18 21 02 CDR  That's about it for azimuth.
04 18 21 05 LMP  Okay. I don't see it, Al.
04 18 21 06 CDR  Well, just put it back down again. Okay.
04 18 21 14 LMP  Okay. I think my PLSS - my OPS is hitting it.
04 18 21 17 CDR  All right, just a second. Let me back it off a minute and move this a little bit.
04 18 21 29 CDR  Okay, that's about it for azimuth. I'll come down a little bit.
04 18 21 32 LMP  Okay.
04 18 21 34 CDR  Let me just check through which way we want to go.
04 18 21 44 CDR  ...
04 18 21 45 LMP  Okay.
04 18 21 47 CDR  Okay, coming down a little bit.
04 18 21 48 LMP  You're down.
04 18 21 54 CDR  Hold it.
Back up just a bit. Right there. Okay, I have the Earth centered.

Okay.

Okay, Houston. Boresighted the - the Earth, dark side and all.

This is Houston. Roger.

Okay. The S-band antenna has been erected and aligned, and the cable has been attached --

And I'll go back in to switch. Okay.

Roger, Ed. And we'd like to get an EMU status report as you go by.

Okay. The CDR's reading 3.75. Reading 76 on the O₂. I have no flags; I'm still in MINIMUM flow; and I'm comfortable.

Okay, and this is Ed. I'm reading 3.75, about 75 percent O₂, no flags, MINIMUM cooling, and I'm very comfortable, too.

Roger. Out.

And, I guess - contingency sample into the ETB.

Okay.

Bruce. Is any appreciable dust flying off of these boots? I'd like not to take all that dirt in there.

I didn't notice any on the TV.

Okay.

And, Houston; I'm back in the LM without a great deal of problem.

Roger, Ed.
CONFIDENTIAL

I'm getting ready to switch to LUNAR STAY. Give me a call, and, if I don't hear you in about 30 seconds, we will go back. Okay?

Ed, this is Houston. You're GO to switch to LUNAR STAY. Go ahead.

And, Houston; this is Ed. How do you read?

Loud and clear, Ed.

Okay, you're on the erectable antenna.

Roger. And how are you reading us?

Loud and clear.

Beautiful.

Okay, Alan; I'm ready for the ETB, most anytime.

Okay. Take it on up. It's ready for you.

And did the contingency sample get in there?

That's affirmative.

It'd never do for us to leave that one behind, Bruce.

Okay. Well, Bruce is loading up the ETB.

Who?

Oh, excuse me. While Ed is loading up the ETB --

Don't I wish it --

While Ed is loading up the ETB, I'll describe the general landing site. We are, in fact, in a -- in a low area. There seems to be a general swale or a wide valley between the Triplet Craters and the Doublet Craters. And we are on -- we are on the downhill side at this particular point. It levels off at a lower elevation to the left of the LM, approximately 15 feet lower there, and then it
starts back up to the rim of Doublet. It's a very uneven landing area here. And, of course, like all of the sections of the Moon, it's pockmarked by a - enormous amount of craters. The surface here, as we pointed out, is mostly fines, and I hate to discuss any kind of lineations here in the immediate vicinity of the LM, because I can see very definite indications of the radial dust pattern caused by the descent engine. And *** any other lineal pattern, as such, right here in the area.

There are perhaps half a dozen very large rocks at the 1 o'clock position from the LM. But perhaps they're ejected from Cone, although they don't seem to have any particular ray pattern. They probably are ejected from - from Doublet, since they appear to be closer to Doublet than they do Triplet. They are a lighter gray in material - excuse me - the material is lighter gray in color, and I'm certain that we'll get some of those samples on the way back from our ALSEP deployment. It's very difficult to assess any kind of stratigraphy in Cone right now, looking back at it, because we're looking into the Sun at a low Sun angle, and it's just not the right direction to view that crater when looking for stratigraphy. But there certainly are boulders on it. From here, it looks as though they're at least 20 feet in diameter perhaps, at least the ones we can see here in the western slope. They appear to be grouped fairly close to the rim of the crater and not too many large boulders on down the sides of the slopes, the outside rim. Okay, it looks as though the LM was traveling slowly forward and slowly to the right. As you'll see from the photographs, that's the direction of the landing gear probes, as they're bent. The footpad, plus-Y, for example, has a drag pattern of approximately 1 foot.

Okay, Ed, how're you doing up there?

Okay, Al. I've got it loaded. I'm about ready to start down with it now.

Okay.
Just another minute. I have - the ISA came loose from its straps and is being a great major headache.

Ed, before you start transferring, you want to verify contents in the ETB?

Okay, let me give you a call on them, Bruce. I put in one black-and-white camera, a television camera, two Hasselblads, one TDS, two 16-millimeter - millimeter MAGs, and two maps.

Okay. Did you get the 16-millimeter camera with MAG attached?

No. Thank you. Guess we kind of need that one.

Yes, that's the one that's supposed to photograph you coming down the ladder.

Uh-oh; all of the contingency - the disposal containers just fell out on the floor. Just a minute. Get the camera.

Okay, Houston. With respect to the erosion pattern, directly under the engine bell, there is *** 3 feet to the southeast of the ... location of the bell. That's probably where the thrust was when the engine was cut off. And the LM slowly drifted to the northwest from there.

As perhaps you can see from your camera, Houston, the view off to the south is an undulating hill. And I would estimate that hill back there to the south is, oh, perhaps 100 feet higher than we are.

Okay, Al. I am ready to bring this down.

Okay.

Wait a minute. Got it.

Okay.

Okay. Let her come gently.
04 18 34 11 CDR All righty.

04 18 34 27 LMP Okay.

04 18 34 29 CDR Okay, just a second here, we'll get a little more tension. Coming over the sill; put a little more tension, please. There you are. Okay, coming over the steps now. Okay. There are the steps, and I'll take it down slowly.

04 18 34 56 LMP Do you have it in hand?

04 18 34 58 CDR Negative. Just hold it right there for a minute. Okay, ease it down a couple of feet. Okay, I have it now. Thank you.

04 18 35 11 LMP And it's all yours.

04 18 35 12 CDR Very good. I've got it.

04 18 35 16 LMP All right. Coming out again.

04 18 35 18 CDR If you want to wait a minute, I'll take a picture of you.

04 18 35 21 LMP Okay.

04 18 35 22 CC Okay. We'll give Al a few seconds to get the camera — —

04 18 36 33 LMP Okay, about ready?

04 18 36 34 CDR No. Stand by 1.

04 18 37 00 CDR Okay, lens cover is coming off.

04 18 37 36 CDR Okay, come on down.

04 18 37 38 LMP Okay. Here I come.

04 18 37 52 CC Okay. Give me a mark, Al, when you start using film.

04 18 37 56 CDR I just started using film now.

04 18 38 01 CC Are you on 24?
04 18 38 03  CDR  12.
04 18 38 07  CC     Roger, 12.
04 18 38 10  LMP    Okay. Let me close the hatch.
04 18 38 21  LMP    But not too far.
04 18 38 40  LMP    Tell me when I hit the bottom step.
04 18 38 42  CDR    You're at the bottom step.
04 18 38 44  LMP    I'm on it?
04 18 38 45  CDR    Yes.
04 18 38 46  LMP    Oh, okay. I want to miss the LR cubed. Okay? And I'm down.
04 18 38 57  CDR    Okay. Camera's stopped, Houston.
04 18 39 00  CC     Roger.
04 18 39 04  LMP    Okay, up one flag.
04 18 39 08  CDR    Okay, we're right on the time line. Right to the minute.
04 18 39 25  LMP    Okay, I'll take the camera, while you get the flag set up. Okay. I'll go off to the left over there by the SWC. It will be on television.
04 18 39 39  CDR    It will be the best place, I guess.
04 18 39 41  LMP    Okay, f/8.
04 18 40 14  LMP    The camera was on 1/60th. I hope it - got bumped there.
04 18 40 18  CDR    No, that's where it's supposed to be for you.
04 18 40 20  LMP    Was it?
04 18 40 21  CDR    Yes. 2.8, 1/60th.
04 18 40 24  LMP    Okay.
You got it?

Aim my camera out there at about the right spot.

Okay. Let's see. Up there on the rise? Be okay?

Let's see where you're pointed.

Over there on the rise?

Okay. Let me point a little bit further around that way.

Out there in the sunlight, I think, with ...

Okay.

Antares, Houston. The flag is going off the camera to the right.

How about that? You back in, Houston?

Al, this is Houston. We still show you're off -

Okay. You're coming back in now.

Okay.

Al, we're not going to - we're too far around.

We're not going to be able to get it with a 16, Al.

Well, we can put it down here close by, if you want.

Just put it right out here in front --

Al, this is Houston. I think it would look a lot - lot better if you could bring it over closer towards the TV.

Put it right here in front of us, Al.

Okay.

Maybe on this - on the TV camera side of the LM shadow.

Roger.
At 01:30, 20 feet.
Just about right here.
There you go. ...
Okay.
Okay. Camera going here.
Give me a mark.
MARK. It's running.
Roger. Out.
How's this, Bruce? Look okay?
That's a good site.
Good. Goes in very easily.
It does, indeed.
You're going off camera to the right.
That's good.
Okay. Take a picture this way, and then we'll swing it around so they can see it in the television.
All right.
Okay, let me straighten it around a little, if I can here.
Okay we can see it.
Okay. There we go.
I think I'm still too close to you, Al.
Watch out for the LM leg.
Yes.
Okay. And when you're finished, you can flop it around so they can see it a little better on the TV.

Okay.

Okay, and which magazine are you using? *** Hasselblad?

Indianapolis-Indiana.

Got your feet in the TV cable, Al.

Roger. Indianapolis-Indiana; but that was my line.

Al, watch your TV cable.

Thank you.

And the S-band cable both - Got them both. Back up. Try it again.

Okay, you're clear.

Okay. Okay. Ready?

Ready.

Okay. Got it.

Houston. Give me a good orientation for the flag.

What's the final exposure number?

25, 25.

Okay, Ed. If you just turn us broadside - Just turn it broadside to the TV camera with the field to the TV camera right; that is, 180 out from that would be better.

Okay.

There you go. You got 25 on the MAG.

... Al.
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<th>Time</th>
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<th>Message</th>
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<tbody>
<tr>
<td>04 18 46 24</td>
<td>CDR</td>
<td>Okay, Houston.</td>
</tr>
<tr>
<td>04 18 46 25</td>
<td>CC</td>
<td>That's good on the flag.</td>
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<tr>
<td>04 18 46 26</td>
<td>CDR</td>
<td>Okay.</td>
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<tr>
<td>04 18 46 34</td>
<td>LMP</td>
<td>Did you shut off 16?</td>
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<tr>
<td>04 18 46 35</td>
<td>CDR</td>
<td>No.</td>
</tr>
<tr>
<td>04 18 46 36</td>
<td>LMP</td>
<td>Okay. 16 is off, Bruce.</td>
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<tr>
<td>04 18 46 43</td>
<td>CC</td>
<td>Stop.</td>
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<tr>
<td>04 18 46 47</td>
<td>LMP</td>
<td>And there's a little bit left —</td>
</tr>
<tr>
<td>04 18 46 49</td>
<td>CC</td>
<td>You have about 3 minutes remaining on that magazine, Claremont-California.</td>
</tr>
<tr>
<td>04 18 46 54</td>
<td>LMP</td>
<td>Roger. We won't change it. Okay, I'm going to press on out for the TV PAN, Houston.</td>
</tr>
<tr>
<td>04 18 47 06</td>
<td>CDR</td>
<td>And, Ed - while Ed is doing that, Al is going to proceed with photographing the landing gear and general features about the LM.</td>
</tr>
<tr>
<td>04 18 47 18</td>
<td>CC</td>
<td>Roger. Using Indianapolis-Indiana.</td>
</tr>
<tr>
<td>04 18 47 26</td>
<td>LMP</td>
<td>Okay, Houston. I will on my - for my first sector per PAN, I'll point a little bit more to the south.</td>
</tr>
<tr>
<td>04 18 47 38</td>
<td>CC</td>
<td>Okay. We want to go to a zoom of 25 on this.</td>
</tr>
<tr>
<td>04 18 47 43</td>
<td>LMP</td>
<td>Roger.</td>
</tr>
<tr>
<td>04 18 47 57</td>
<td>LMP</td>
<td>Okay. You're zoom of 25; focus going out toward infinity. And how's your picture, Houston?</td>
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<tr>
<td>04 18 48 15</td>
<td>LMP</td>
<td>Houston, this is Ed. Al?</td>
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<tr>
<td>04 18 48 23</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>04 18 48 24</td>
<td>LMP</td>
<td>Think we lost comm?</td>
</tr>
<tr>
<td>04 18 48 26</td>
<td>CC</td>
<td>Go ahead, Ed.</td>
</tr>
<tr>
<td>04 18 48 29</td>
<td>LMP</td>
<td>Okay, how's your picture now?</td>
</tr>
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</table>
Roger. It looks good.

Okay. Can you see the horizon?

... affirmative. The horizon is about two-thirds of the way up from the bottom of the tube. The flag is over near the left-hand corner of the field of view. And that little rise is sort of centered --

Okay, that's just about where I wanted it.

-- with the small crater off to the left.

Roger. The horizon that you see - far horizon, Bruce, is a ridge that seems to run around this bowl that we're sitting in - appears to be a ridge. It runs down from what we called "Old Nameless" to the south, and it runs to the west. It seems to be roughly circular, but, of course, we could be a little bit deceived at this point, on that - that score. The little rise you see in front of us is a rise that's shown on - on the map with - the craters are on the map. Since I don't have it handy, it - I'll have to give you the coordinates later, but I think you already know them. They are about 150 feet south - south ... of the LM. Go ahead.

Roger. If you're going to spend several seconds describing each of these locations here after the camera steadies out, you might just as well zoom out a ways, and we'll pick up some features at random on higher magnification, and zoom back in when you go onto the next 45-degree sector.

Okay. All right, I've moved around to the next sector now. And it's looking down over what we used to call Cloverleaf - although it's not obvious from here what the cloverleaf was. There is a fairly significant crater of - about 250 to 300 yards out. I'll try to come - bring it in for you.

Can you see it out there, Houston?

Yes, you're doing fine. Keep zooming, if you've got any left.
Okay. Let's zoom all the way.

Well centered.

Okay. That crater is --

Okay. Beautiful.

-- It's kind of in a low spot, but it's not the lowest spot in this dip that we're in. The lowest spot we will pick up in our next sector, although we'll shoot across it because you won't be able to see it.

Okay, bring her back in.

Okay. Now, another sector to the right, facing almost down-Sun. And --

Roger. We got your shadow.

Okay. It's a very low spot. The deepest part, I guess, of what we were calling Cloverleaf before, although I did not realize how deep that depression was, and I still don't quite get the --

Okay, zoom out while you're talking.

-- Okay. Can't quite get the relief in my mind, because it is so different than what I expected. Where you're looking at now, this deep part, is to the south of Doublet, and it's probably 75 to 100 feet below where we are, rising up on the far side to above us.

Okay, you're aimed up a little high.

Okay. How's that now?

A lot better. Say, Ed, you don't need to stop talking when I talk, if you can do both at once.

Okay. I have a little trouble listening to you and talking at you, too. Not polite (laughter). Okay. I'm bringing it back in and coming around through the west-northwest, and you should be able to see in the distance Doublet Crater. And I've lost it now because of the Sun angle, but it's
just about on the - on the near horizon. I'm sorry, there are three mounds, three ridges. The nearside - the nearest one - the ridge that Doublet is on and then the far horizon. And I'm bringing them - bringing it on out for you. Doublet is on the second - second hill that you see. Pick it up out there, Bruce?

Roger. We can see the ridges, and I - and I can see a crater that probably is Doublet.

Okay. We'll zoom back in and move on around; I think Al's about to finish up his task over there.

Negative. I'm still working at 8 o'clock.

Oh.

Ed, I just wonder how come McCandless has the audacity to presume that we're wrong about Doublet Crater (laughter).

Very presumptuous. Okay, Bruce, I'm coming around one more sector. And you should be able to - I'm going to move it just a little bit more - you should be able to see the large rock, the four or five rocks I was talking about in my discussion before we got out of the LM. Now I'll zoom in on those, if I may.

Here we come.

Okay, now point the camera down a degree or 2.

Okay. How's that?

Beautiful. You might come right a degree or so. I see the small rocks off to the right. Okay.

Okay. And I might add - I mentioned a quadruplet chain of craters. Well, they're right here in front of me --

Point it down a little.
Okay. The quadruplet chain of craters starts right here in front of me; well, it's halfway between the rock and myself and moves across here; now, there're quite a few --

You're getting all sky.

Let me zoom back in again.

Hold it.

Okay. How's that now?

Good.

Okay. There's the south quadruplet crater, and then there's the next one and the next one and the largest one. You can see --

Good.

We probably better go back to zoom 25 and press on with the panorama.

Okay, I'm at zoom 25. And I'm looking almost due north now. I'll swing back around and PAN for my rocks. There's the rocks we were looking at. Panning slowly to the north, you can now see the undulation, the ridges that Al was talking about --

There's not a level portion out here --

north now. I'll swing back around and the

Roger.

-- that's more than a few square meters. And you can see at least three ridges between us and the horizon. I'll zoom in out here once more. Let you see it close -- close-hand what's out there. Another pile of rocks or ridges.

-- that's more than a few square meters.

You're pointing at the sky.

Okay. You need a gunsight on this thing.

That's better.

That better?

Yes.
Okay.

The horizon is about one quarter of the way up. Beautiful.

Okay, Houston. Al is finished with the documentation. Counter, 110.

Roger, Al. 110, Indianapolis-Indiana. And, Ed, a frame or two ago it looked like one of those rocks was split right down the middle; did you notice that, too?

I don't think it is; I - It may be - it may look like it from there - we'll go by there later on.

Roger. Let's press on with the TV panorama.

We're about 2 minutes behind time line at this point, Ed. You're looking at sky again. *** her down. *** Ed, we're recording all this on video tape so that it only takes a relatively brief period of time looking at the - the scene that we can play it back, frame at a time, later on. *** 25?

Are you reading me?

Ed, are you reading Houston? Doesn't look like Ed's reading anybody.

Ed.

Oh, God.

Ed, this is Houston; we're not reading you.

Okay, Bruce, now you are; I hit the transmit switch to OFF. The --

Loud and clear.

The horizon that you see in this view is the north flank leading up to Cone Crater. It's proba - it's over a mile away - a mile and a half away. I'll give a quick zoom in on it. And then I can't go any closer to the Sun right now. I'm at my limit.
Okay, we're --

Okay, you're looking at sky again.

Okay. There you go.

Okay, we're --

Beautiful.

-- at the time to deploy the MET, Ed, if you want to swing it on back around.

Okay. Bruce, what was the zoom setting you wanted — right here for the — for the MET and the MESA?

Let's try about 45 there; we'd like to get the flag in at the right extremity and the plus-Y, if we can, at the left extremity. Hold that.

How's that?

PAN left about 2 degrees — 2 degrees. Okay, that looks —

Is that okay?

Crank it out about to 40 on the zoom.

Okay.

That's really —

That's good.

Okay. Here I come.

Okay. Al and Ed, if we could get you both in the field of view there for a minute, we've got a message for you.

Okay.

Okay. You're looking lovely, troops. Why don't you take a pair and let me pass a message to you?

Okay.
Okay.

Okay. We were very pleased a few minutes ago to receive a phone call here in Mission Control from President Nixon. He asked me to extend to you and Stu his best congratulations. He said that, like millions of people all over the world, he is an astronaut watcher at this time. The picture is coming in very well at the White House, he said. The President said he knew how many thousands of people had worked on this mission without whom men would not be walking safely on the moon. He asked that I wish the Apollo - entire team, well. The President said he was proud of you and proud of them. He sent you a wire just before the flight wishing you Godspeed, and he wishes you well on your return flight. The President also asked me to invite you to the White House for dinner and to spend the weekend at Camp David with your families after the mission is completed. Over.

That's fine, Deke. Thank you very much. And we appreciate those kind words.

Thank you, Deke. And convey our thanks to the President, please.

Roger. Will do. I don't think Stu got this, but we'll see he gets it later.

Okay. You ready? Get the wheels first.

Okay.

Okay.

Wheels out.

Tires ... up.

180, gear down and locked.

Both tires are inflated properly on the MET.

Yes.

Wait a minute.
04 19 03 03  CDR  Okay.
04 19 03 05  CDR  Okay. Put it there.
04 19 03 09  CDR  Let's get that. ... set up here - there we go.
04 19 03 22  LMP  Well, I see we've had visitors again.
04 19 03 26  LMP  Yes.
04 19 03 29  CDR  Hardly worth mentioning.
04 19 03 31  LMP  Agree.
04 19 03 37  CDF  Okay. Houston, as you can see, the MET is deployed properly.
04 19 03 45  CC  Roger.
04 19 03 47  CDR  Looks like it - looks like it's in good shape.
04 19 03 51  LMP  Okay. I'll get a camera.
04 19 03 59  CDR  Okay, if you want to - Okay, that's right here - I'll move around to put the TV camera on the scientific equipment bay.
04 19 04 10  LMP  Okay.
04 19 04 11  CC  Antares, Houston. We'd like to get an EMU status report at this point.
04 19 04 16  CDR  Okay. CDR is 3.7 and reading 72; no flags. I'm on low flow and in good shape.
04 19 04 31  LMP  And the LMP is 3.7 and reading 67 percent; low flow, low cooling, and feeling great.
04 19 04 48  CDR  TV camera - -
04 19 04 49  CC  Roger.
04 19 04 50  CDR  -- TV camera is covered, and proceeding to the rear of the LM to observe the deployment of the ALSEP.
04 19 06 01  CDR  Okay, Houston. The cover is coming off the lens now. How does that look to you?
Roger, Al. Are you - are you all the way back at the 30-foot position there? ... 30.

Well, it's about - it's about 30 right there, I'd say. A little hilly here.

Okay. Our picture is moving around a lot; you're going to have to set it down and let it stabilize before we can tell you anything about it.

I'm trying to find a level spot, Bruce. We're in --

Okay. What zoom are you on?

We're on the side of the hill, as you probably have heard. And it may not stay; it may tip over.

Can you poke one of the legs into the surface there?

That's what I'm doing at the moment.

That's a pretty clumsy tripod, I realize.

Okay. Do you know, I think it will stay now?

Okay. How's that?

Okay. What zoom are you on? Back off the zoom some.

Yes. I think we'll have to.

Okay, Bruce, can you see the bay?

Wrong way.

I'm ready to start opening.

Roger. I can see your hands very clearly. We seem to be close *** Hold that zoom, Al. Okay. Looks good.

Okay.

Beautiful.
Okay, the door is - guard door is open. Let's see, K-bay [?] door is open. Pulled a little stiffer than I expected in one-sixth g.

Okay.

Looking good though, Ed. And you all are within 9 minutes of the time line.

Okay. We'll pick it up here in a little while. Okay. Ready with number 1.

Hey. Number 1, coming out.

Okay. Got her down.

Okay. I'm going to move it over a little bit here.

Okay. It's almost as heavy as you are.

Who's talking?

... move over. Man, it's rough to find a level spot to put anything. Okay. Number 2 is coming out.

Okay, can you get that by yourself?

Well, it's - I think so. Let me - make sure. It's not going to vibrate too much? Okay, and it's on the surface. Oh, all this beautiful white paint is sure going to get filthy out here.

I'll have to bend a little bit. I just can't bend down to that.

Okay.

And the handtool carrier's clear.

Roger.

***

Say again, Houston.

Nothing, Ed.
You know, I fully expect to see Stu and Ron come running around to pick up the pit pins and the thrown-away parts.

See this - Okay. I think there's a pretty level place right there.

Cops. Excuse me.

Okay, I'm ready for the fuel cask.

Okay.

Roger, Ed.

The handtool carrier, as you can undoubtedly see, is on the MET. No problems.

Okay. Temperature indicators on the mast show that there's been no heat.

Roger.

And the cask is coming down.

... Ed.

And it's down far enough, I believe.

Okay, stand by 1. Not the best place in the world to work. There we are.

Okay, if we can get the lid off of it.

Watch it. That's probably pretty hot. Okay, it's locked.

Got it?

Think so.

... down a little bit. Got a little more in right there. There you go.

Okay, good. Houston, the lid is off the nuclear fuel cask. And I have none of them --

Did you report TEM2 levels?
04 19 18 36 LMP
--- No TEMP indicators that are black. You want to take that? Got me in midthrow there. Okay, it's open.

04 19 19 14 LMP
Okay, the cask ready?

04 19 19 16 CDR
Okay. All set.

04 19 19 31 LMP
Okay.

04 19 19 49 CDR
This slight slope is about as level as we can get from here.

04 19 19 52 LMP
Okay.

04 19 19 57 CDR
Okay, looks good. All right, a little more this way. There you go. Very good.

04 19 20 21 CDR
The reading on that tube?

04 19 20 24 LMP
Yes. I'll get it in a minute.

04 19 20 25 CDR
Okay.

04 19 20 32 LMP
And, Houston, all of the temperature indicators are still white.

04 19 20 39 CC
Roger, Ed.

04 19 20 45 CDR
Okay, the doors are closed.

04 19 21 32 LMP
Okay.

04 19 21 34 CDR
Okay, Houston. We're going to cover the television camera, load it back to its original location.

04 19 21 39 CC
Roger, Al. For your information, you're approximately 7 minutes behind the time line at this point.

04 19 21 48 LMP
Okay.

04 19 21 53 CDR
Okay. Where do you think's a good spot for the ALSEP?

04 19 21 57 LMP
Oh, boy. That's going to be tough, Al. I'd just head out toward Doublet out there and let's look.

04 19 21 59 CDR
Which way?

04 19 22 00 LMP
Right toward Doublet.
I think that's the best way. Aim for the center of Doublet. Aim for the - Yes, aim for the center of Doublet, and let's go from there. However, I think maybe we better go a little further south, or we're going to violate that CCIG constraint if we go too far north. How about toward the south edge of Doublet?

Hey, why don't you point it at us, and we'll just pick it up on the way out?

What's that?

You ought to point it at us, and we'll pick it up on the way out.

Well, we're supposed to - Okay, right now - you can put it here and watch the MET deployment, if you like.

Okay.

Okay, Houston. We're about - a 40-foot zoom now - on the area of the MESA and the MET. How does that look?

Houston, are you with us?

Roger. Let's go to 50.

Okay, 50.

And come right about 3 degrees. Very good.

Okay.

Okay. Got the television camera there?

Yes, it's down in the bottom.

Okay.

Hey, Bruce. As I mount these 70-millimeter cameras on the MET, I just flip the little spring clip; I just pick up the whole MET and drag it along. I can't do that when they get - get a little more weight on there.
Okay. We got that, Ed. Be sure you get the large scoop on there replaced.

Yes. Okay. Bruce, I've put on two Hasselblads, and I'm going ahead and getting the 16-millimeter on and getting it out of my way right now.

Okay, Ed. Two Hasselblads plus the 16-millimeter.

Right. And I've just started the TV bracket, and I'm open - getting ready to open SRC number 1.

Okay. Black-and-white television - -

And, Al, have you gotten - Roger.

Black-and-white TV camera's on the plus-Y strut - on the footpad.

With the white surface normal to the line of the Sun?

That's correct. On dimension horizontal.

Roger. Roger. And on magazine Charlie-Charlie, I show you still have 3 minutes remaining.

Okay. We'll leave it on there, then.

Roger.

Okay, SRC-1 is open. Okay.

Oh, damn, dropped the weigh bag.

Wait a minute.

I'll get it.

I can give you some tongs, if you want them.

Okay. It will probably save *** any dirtier than necessary. Well, I dropped both of them. The ***

Okay. May as well put them in the pocket when you're through.

Okay.
Okay, Houston. Magazine double Dog and double Easy going on the MET.

*** handle.

Roger. Delta-Delta and Echo-Echo.

Take that baby up a little.

Yes. ... and while you're getting that ready, let me slip these babies in there.

Okay.

That's what I'm sweating.

Okay, good.

*** these suits are ***. These boots are sure ***

And the sand's a little different, too.

Yes.

Well, now.

Damn it!

There it goes again.

I should have lifted it up with one hand and then put it down.

Lift it up and do what?

Lift it up with one hand and put it over the other.

That's what I was going to do - this time.

Okay. It's a bit longer than expected.

Okay, Houston. I've got three core tubes, no tabs.

Roger.

And, Houston, I finally succeeded in getting two weigh bags. And one SESC in, so far - in addition to the other things, plus the core tube cap assembly.
04 19 32 58 CC Roger.
04 19 33 10 LMP Okay, you putting on the other SESC?
04 19 33 12 CDR I've got the other SESC now.
04 19 33 16 LMP Okay, very good.
04 19 34 04 LMP The problem here is the clips are so tight that it takes a monumental amount of force to get them in there. Course, that's the way we asked for them; can't complain. And, Houston, I'm sealing the organic sample at this point.
04 19 34 28 CC Roger.
04 19 34 31 CDR Okay, and we'll put this one in the pocket. ...
04 19 35 21 LMP Okay, Houston. I have the closeup camera.
04 19 35 26 CC Roger. Still reading on even hundreds?
04 19 35 29 LMP I'm not there yet.
04 19 35 44 LMP Didn't want that to get away from me, but it did. Got it. Okay. Houston, it's turned on, and it's reading 300.
04 19 36 04 CDR Okay, can you see that little flag, Ed?
04 19 36 09 LMP Huh?
04 19 36 10 CDR Ed, can you see that little flag all right?
04 19 36 12 LMP Yes, I think I can see that. Good show.
04 19 36 36 LMP Okay, and here's one hammer for you.
04 19 36 39 CDR Okay. Thank you.
04 19 36 48 LMP Okay. We finally got to touch the flight gnomon.
04 19 37 04 CC 21 Nancy.
04 19 37 06 CDR (Laughter) Glad you're still with us, Bruce. Okay. Break there.
Okay, let's put that baby over here. That your last item?

Let me doublecheck. Let's see, 1, 2, 3 - -

Okay, Houston. We'll start a rundown here; I think we are about ready.

Yes.

Got the core tube cap assembly, extension handle, two sets of - two sets of tongs. We have a numbered geophone anchor on the front. We have the tether, the gnomon, the hammer, the scoop. Three core tubes, 35 bag dispensers, closeup camera, two SESC's, two 70-millimeter cameras with solar exterior, one 16-millimeter camera and one MAG, four weigh bags, two maps, extra number geophone flag, large scoop is on, right. Large scoop is on, and we're taking the trenching tool with us.

Okay, and you should have 16-millimeter and two MAGs.

That correct; we have a total of, I was just going to say, a total of three MAGs; one is almost used and the other two are clean. You with us? You with us?

Roger. Looks good.

Okay. Let me just look at something.

And why don't you give us EMU status check before you set out?

Okay, the LMP is reading 3.75 and about 55 percent medium to low - low cooling. Doing great.

Okay. Say again the percentage, Ed.

It looks like I'm reading 50 - No, sorry about that.

Man, it's hard to see.

Yes. I'm reading 55 percent, Bruce.
You're reading lower than that. It must be.

Roger.

No, I'm reading more than that. I'm reading 55 percent.

You are? Okay.

Go ahead, Al.

Okay, Al is at 3.75, reading 62 percent, and I have no flags; I'm on MIN cooling and I'm very comfortable.

Roger. Out. And we need to point the TV camera out to the ALSEP site.

Al, I'll go get it.

Let me zoom on out and get that. I think I'll aim it a little bit to the left of that bright crater on the side of the west wall of Doublet.

Hey, that's a good place, Al.

Say, Al, if there's any uncertainty as to the deployment area, we'd rather go to a zoom of 100 instead of a zoom of 150; but if you think you've got a good site picked out now, why, we can go to 150.

I think we can find a good site. We may be a little closer to Doublet than the map shows, because of the grade going up there; but I think there's a level site fairly close to the south rim of Doublet, and we'll aim the camera in that general direction and give you 150 zoom. Focus at infinity.

Roger. Out.

Okay. You should be able to see on the right side of your picture when I settle down here. You should be able to - ***
Al, you can get quite a ways further out, if you want to; you've got a little cable left.

*** we're aimed right for the south *** Doublet now, South Doublet; and you'll probably be able to see *** star crater right in the very edge of your field of view. *** stop okay?

Yes, f-stop's fine. I've got what looks like two ridges and then the horizon in the picture, and I see a - just past the second ridge - -

It may be two small boulders.

Okay, may be.

Okay. I think we can find something out there that fits the bill.

Okay. I'll go pick up the barbell.

All right. The LR cubed is there on the front step.

Al, this is Houston. We'd like to try f/22 and peak.

Okay; you caught me just in time.

Okay; f/22 and peak. How does that look to you?

Roger, Al. And we'd like to elevate a little bit, so that we get the horizon in.

Okay, we'll try. How's that?

See if you can depress a little now. It's real touchy at this long focal length.

Okay. We'll try to depress a little bit.

Okay, you still have the horizon?

Okay, that looks good for elevation; and if you've got us aimed at your proposed deployment site, we're GO.
04 19 45 27 CDR  Well, it looks like that's the way we're going. You'll just have to stay in that line of sight, Bruce.

04 19 45 32 CC  Okay. Very good.

04 19 45 44 CC  Roger. You want a GCA?

04 19 45 47 CDR  Yes. I think if you aim for a little to the left of that --

04 19 45 53 CC  Well, our ASR isn't working very well; but if we can once get you in the field of view, we'll acquire you.

04 19 45 59 LMP  Roger. I'm headed over that way.

04 19 46 58 LMP  Can you see *** yet, Bruce?

04 19 47 04 CC  Negative, Ed. I believe you're off to our left.

04 19 47 08 LMP  They won't get in the field of view until we get up pretty close to the site. Okay.

04 19 47 12 CC  Okay. You're coming in now.

04 19 47 13 LMP  Okay. I'm going to stop here and rest for a minute, Al. This darn thing is heavier than I expected.

04 19 47 23 CC  Okay, Ed. We've got you in the field of view over to the left, now.

04 19 47 27 LMP  Okay. Al should be coming in right now, too.

04 19 47 49 CDR  Looks as if it might be a little secondary impact crater here by me.

04 19 47 52 LMP  Man, there's so many different types of craters around here, you could - we could spend the whole EVA within a hundred yards of the LM. Okay, lead on and I'll follow and watch the MET for you.

04 19 48 04 CDR  Okay. Going to your right.

04 19 48 22 CDR  Okay, Houston. We're proceeding over a very fine-grain regolith we described before. Undulating surface getting more sloped --
Okay. You need to angle left just a little bit.

Left?

Yes, you're doing fine, now.

Say, Houston. This looks like brown talcum powder; it's so fine in most places.

I think the Sun angle is increasing now.

The MET's going off to the right.

The MET's trying to find a smooth place to go.

Al, I think you'll have to go around this crater, here, to the left. I think we can find our way down. Good heavens, that's a deep hole. But I guess we can get it - make it, either way.

Say again.

I said we could make it, either way.

Okay.

See those two over there at 10 o'clock? Al, we can see those are on the map.

The two at 10 o'clock?

Yes.

Yes. Okay, Houston. We'll be dropping down out of sight for a while, probably. Going down in - in a depression.

Well, I don't know.

I don't know either. Let's stop a minute, Al.

I'm not sure but what we've picked just about as good a spot as anywhere.

I think so.

It looked a little further out here, because of being closer to zero phase, perhaps.
I think that's it, but it's not a bit smoother than the other. I'll be darned if I know what to do.

Well, we'll move on a little closer to Doublet.

Okay. Okay.

Well, I think the first ridge over there, about another 75 yards, might be our answer. Right beyond this next - these next two craters.

Yes, I think so. It's probably a pretty good spot. About right up there.

Yes.

Okay, Houston. We're in the general area of the planned ALSEP deployment now - on the chart. It's in a depression, and I think we'll move on a little closer to Doublet to give it a higher elevation.

Roger. You're visible from - about the armpits up, right now.

Okay.

Think you ought to press a little - bear a little to the left, Al.

Yes. I guess we'll have to. Nothing like being up to your armpits in lunar dust.

I think just to the left of that rock that's ahead of us, it provides a path through here.

The MET seems to be riding very well, Houston. It's bouncing a little bit, making nice tire marks, but not about to turn over. It jumps about a foot every time it hits a small rise, but very stable.

Are you getting any dust thrown up by the tires?

No. There is a little bit, Bruce, but it's not - the dirt feels to be kind of clumpy.

Okay, I guess that ridge is the best place.
I think so.

How are you doing?

Fine.

You still on your television, Bruce?

Yes, indeed. You're very well centered.

*** ought to be coming back in now; we're coming up to - the grade here.

Roger. I can see your shadows now, so - I guess - in fact, I can see your feet; so, you're well in view.

Okay, about another 30, 40 feet now, and I think we're as good as we're going to get.

Yes. What we're discussing here, Houston, is - grade going up to South Doublet. It is very consistent, and it's difficult to find a level place.

Okay. Let's set it down and look for a minute, Al.

All righty.

Then, we can see here where we are.

I don't know but what this - this rise we're standing on right here - it's about as good as any. Okay, now, there's a 20-meter crater there.

Okay. You got that other map on there, too?

Yes, it's in the pocket. Now, let's see. Okay, the one - that one right - right there. Let's see if we can find those. The big one. May I see it a minute? Can we spot that one and those two?

That one's right over there, I believe. Isn't it? That's an old rounder one right there. See what I mean?
Yes, that may be. What's this one right here? That one right beside it. Oh, I don't know whether we're that far out or not, Al.

... that little, looking for that little distance thing. Here we go.

Okay, I'd say we're probably about 400 feet out, almost directly out in front. Plus-X.

Okay.

I think ... 80 meters along the track.

Look here. See that crater right in between those two traverse tracks?

Yes.

Okay, those two craters and that crater that you pointed out.

Right.

Okay, I think that one between the traverse tracks is that one right there.

Okay.

On the hill, the two - those right over there and the one you pointed out, this one, is that one over there, the big one behind it. Now, I think it's out of sight, unless it's that one over there.

Well, where do you think we are?

I think that we are to the north - I think we're about BR; and, let's see, we're south of that - We're about CQ 0.8 and 62.5 - 61.5.

Did you read that, Houston?

Roger. Charlie Quebec 8 at 61.5.
Okay. Let's move directly toward that big rock up there, about halfway between here and there. It's about right up in there.

Yes. I need this clear area down here for that thumper.

Okay, let's put it right up in there.

Right up there, on that spot?

Yes, you got it. Okay, Houston. We're going to move about 10 meters to the west-northwest from those coordinates that Ed gave you. That will be where the ALSEP central station will go. We reserve the right to change our mind as to where we are, when we get up on the hilltop.

Okay.

Okay.

I'm going to have to pull it over here a little, Ed; there's a crater there.

Al, that's - that's right about where we are.

Okay, we've lost the NET off to the right of our picture.

What's wrong with right about here? It would just be a nice clear shot down there with the thumper.

Can you still see Ed, Houston?

Yes, he's at the extreme right-hand edge of our picture, Al; and you're off.

Okay. We'll turn them back on. This is where we're going to deploy.

Well, I guess the primary consideration, of course, is to find a good site; and our being able to watch you is secondary.

Yes. We understand, but it's all pretty much the same; the upslope is about - 4 or 5 degrees,
pockmarked by all types of craters. They're all old craters; but, nonetheless, they produce a very uneven surface. And I think we've found a spot here as reasonable as we'll find anywhere.

04 20 00 51 CC Roger. Out.

04 20 00 52 LMF Let's see, Al. But those two craters right there are going to be in the way. I think I'd like to move back here about 5 feet. Better than having to run through those going south. Or I can leave a central station about where I've got it, I mean, the power generator. Think that'll be all right?

04 20 01 20 CDR Are you done with your thumper geophone line?

04 20 01 22 LMP Yes, I'm through.

04 20 01 23 CDR Your line will put you right through those two craters. That'll give you a good reference.

04 20 01 26 LMP Well, I'm going to have to go this way, so — because I can't fire into that ridge. I've got to put it more north, right up that way. Then, I'm going to go right down across through there. Okay, this looks good to me, if you're happy with it.

04 20 01 43 CDR Let's see. Southwest is right — The best spot is right through those two craters.

04 20 01 47 LMP I'm going to have to go almost due south of the — I mean, southeast of these.

04 20 01 50 CDR I'm going to have to go due south.

04 20 01 51 LMP Okay, you can go by the right edge of that baby.

04 20 01 55 CDR Yes.

04 20 01 57 LMP Okay, very good. Okay, we've got a spot, Houston. We will proceed with the deployment.

04 20 02 04 LMP We're not quite as far from those coordinates as we thought we were.

04 20 02 09 CC Roger, Antares.
Okay, Houston. We will start the 16 millimeter going here and - We may have to change magazines.

Okay, give me a hack.

I'll give you a hack.

Roger. I'll keep track. And, if you have a free minute, we would like some commentary on the depth of the MET tracks.

Well, it's - Bruce, let us take a picture for it after a while. We can see the MET track clear back to the LM. They're about three-quarter of an inch deep.

Roger.

Can't get any closer without falling in that crater, Ed.

It's fine right there, Al.

Okay.

Okay. ... six frames per second.

I can see that this is going to be a considerably slower process than I expected.

Has he started it yet, Al?

Stand by.

MARK. Camera's running six frames per second.

Roger.

And, for reference, Al and Ed, you're about 29 minutes behind the time line at this point. Over.

Okay.

Okay; Ed is working on the central station, and I'm going over for the subpallet.
Houston, the RTG cable temperature is 175 degrees.

Roger. Out.

Okay. Subpallet is deployed northeast of the central station.

Houston, the current --

Roger. Out.

-- current reading is 8.

Understand 8 amperes before pressing the switch.

That's affirmative.

Roger.

*** that looks beautiful. *** all full of dust.

*** Everything else is going to be full of dust before long. Be filthy as pigs.

Okay. I'm going to have to lift this up. You want to help me?

Okay. What you want to do?

I'm going to have to lift it up and shake the dust out of it that Boyd bolt. I can't get it otherwise.

Okay.

Okay. Watch it.

There it goes. Okay, watch that --

Is there anything that's not tied on?

That's loose, yes. I've already taken those out.

Okay, I'll hold it.

Okay. Let's turn it upside down and shake it.

All those little Boyd bolts falling off.
Yes, but them's not the ones I got the problems with. Okay, flop it over a minute.

That'll do it?

No, it's still not clear.

Okay, I believe that will get it.

Let me just try it while it's right here.

Okay, I'll hold it. Go ahead.

Okay.

Got it?

Yes. Let's get the other one.

I know it's down in here somewhere.

Say again.

I know it's down in here somewhere.

Al, this is Houston. For your information, the 16-millimeter camera is out of film at this time.

Okay.

Thank you.

Let me tilt it down a little more; let me hold it, and you go ahead.

I can do it. Turn it around and get the front of it. Can you hold it up a little?

Yes, I got it.

You better hold -

There you are - Oops.

Don't step on there.

Just put it down there, Ed, I guess, is the best way. Let me fuss with it.
Don't step on the PSE cable there.

Let it go.

...

No, it's not going to do it, apparently.

Maybe your tool is screwed up - let's see about - see if mine's any better. Full of dirt.

Ain't no better ... one.

Don't step on it, babe.

Why, I'm not even sure there's one down there.

Well, there should be.

Okay. The only thing I can figure out to do at this point is to lift it up. I'll get it.

Okay. Let's ...

And the cover off.

Yes.

There?

Yes, it's there. See it?

I can't see it; but if you think it's there, go get it.

It's there.

Al, this is Houston. Could you give us some more details of your problems at the SIDE from the sub-pallet you're working on?

It's the SIDE Boyd bolt that's hidden back in the corner. It apparently got full of dirt, Bruce; and we're having a devil of a time getting it off.

The one that's deep in the back. Just can't feel it any longer.
Let's do this. ... seems to be level - oh, good. Thank you. What I want to do is get the Sun shadow in there. And you had it for a minute. No. Tilt it a little more this way.

Okay. Just hold it right there.

Okay. I'll try.

See where it's not.

Okay. What do you want?

Well, I'm having just no luck at all that way. Yes, over there it is.

I'll get it.

Got it? Great. Okay.

It takes two of us to do what half of us can do.

Here we go. Okay.

Did you get it loose, Ed?

Yes, it's loose.

Yes, we got it. Okay, let me move it up. Are you ready to go?

Yes. I'm ready to get the connector.

Go on. We've got it.

Okay. And here comes the SIDE out the subpallet.

Okay, let me get the connector and -

Wait a minute. Don't drag the connector through the dirt.

Why don't you move this thing? Then, I need the tape to pull it up.

There you go.

Okay.
Ed, this is Houston.

Go ahead.

Roger. Your 16 millimeter's been running about 9 minutes, now, since it ran out of film. We're using juice from the battery; and, also, we'd like to get the MET turned a few degrees. You've got a specular reflection coming right back to the TV camera. Over.

Okay. I'll do that right now, Bruce.

I'll get it.

(Humming) Okay. The SIDE connector is connected. Am I clear to press the shorting switch, Bruce?

Houston?

Roger. Go, Ed.

Turning switch is depressed. You'll be able to read it in a minute, I think.

Is that - better on the reflection, Houston?

Yes, indeed. That's much better.

Okay. Camera's off.

Roger.

Magazine Charlie-Charlie is off?

Magazine Echo-Echo will be going on.

Roger. Esmerelda-Equador.

He's got a checklist beside him that's got those, Al. There's no way you can beat him at that same.

What have we done to deserve this?

You'd better believe it.

What have we done to deserve this?
Just wait until you get to J-J.

(Laughter) I'm nervous - I'm nervous already.

Okay; f/8, six frames per second, 250th.

Roger. Give me a hack when you start it.

Okay, Bruce. Stand by.

HACK, HACK.

And, Houston, I verify that the switch number 5 is clockwise.

Roger, Ed.

And the thumper geophone's coming off, now.

Hey, got pretty good range out of that baby.

Man, that thing really went, didn't it?

Good range out of that baby.

Al, this is Houston. Could you tell us where you are in the SIDE or PSE sequence?

Yes, sir. The legs of the SIDE have been deployed; PSE stool is being placed 10 feet north from the central station.

Roger.

Okay, Houston. The thumper is stowed on the MET. I had to get the first geophone out in order to get it there, but we'll take care of that in a few minutes.

Roger, Ed.

Now comes the task that tries men's patience: getting the mortar pack off. And it's coming off, now. Incidentally, how much are you able to see, Bruce?

It's in my pocket. ... pocket?

Yes. Okay. ...
04 20 28 05  CDR  Hey, that's got to be -

04 20 29 05  LMP  Okay, Bruce. The mortar pack is in place.

04 20 29 24  CDR  And we've had interim deployment of the PSZ.

04 20 29 31  CC  Roger, Al.

04 20 29 50  LMP  You know, I don't think the solar wind is going to blow our antenna over like it generally does.

04 20 29 56  CDR  How about that. Steady as a rock.

04 20 30 00  LMP  Okay, the CPLEE's starting to come off now. Watch it, watch it, watch it, watch it.

04 20 30 05  CDR  Yes, thank you, thank you, thank you, thank you.

04 20 30 08  LMP  And let's see if I can get it back in line. Can you tap it toward me a little? We're a little too close - if we can get the - the whole thing a little further away. Kind of push it with your foot.

04 20 30 20  CDR  I don't want to get too much dust on it; bad enough as it is.

04 20 30 33  LMP  About another 8 inches or so. That looks pretty good.

04 20 30 38  CDR  That about level?

04 20 30 40  LMP  Yes. It looks pretty level to me, Al. Okay. CPLEE's coming off.

04 20 30 47  CDR  No, it's not.

04 20 30 51  LMP  Well, okay. We'll fix it up. When you get that baby out there.

04 20 31 02  CDR  Okay, Houston. Al is reading 3.75, reading 55 on the C2. I have no flags, I'm on MINIMUM cooling, and very comfortable.

04 20 31 17  CC  Roger, Al. Go ahead, Ed.
Okay, hold 1 here. Okay. Ed is reading 3.75, is reading 43 percent, and is reading - has no flags, is on MINIMUM cooling, and feeling very comfortable.

Roger, Ed. And, for your information, Antares, those numbers compare very well with our predictions, and it looks like you’re going right down the old line.

Very good.

And just by way of reference, I show you about 36 minutes behind the nominal time line at this point.

Okay.

Okay. We'll give you a little credit for that, Bruce. Better make up your mind as a television technician.

Roger. And we're looking right now at about a 30-minute extension. I'll have more word for you on that later.

Okay. We'll keep plugging ahead here. Okay. Have a good ... amount of dirt. Central station is level.

Okay, Houston. The CPLEE is deployed. It is - the ball is within the inner ring and it is lined up the east.

Roger, Ed.

And we're going for the SIDE now.

And it looks clean and pretty, doesn't it? That little CPLEE all sitting there?

It won't long.

All prim and proper.

You look very white and prim and proper yourself. Little tarnished now, but - -

Except for the lower extremities, huh?
CONFIDENTIAL

Day 5

04 20 34 19 CC
Ed, Houston. You confirm interim or initial mortar pack deployment?

04 20 34 25 ICP
That's affirmative. I confirm it. It's lined up almost due north, Bruce, in order to have a free flight away from all craters I can see and still miss the ridge that we're worried about.

04 20 34 44 CC
Roger. We copy.

04 20 34 54 ICP
And I'm heading out with the SIDE and the CCG at this point.

04 20 35 02 ICP
Say, Houston, relative to the CCG, since we have these ridges to the south of us and this thing is being deployed somewhat in a hollow, is this going to upset the investigators?

04 20 35 21 CC
Stand by. We'll get you an answer on that.

04 20 35 32 ICP
I don't really know what else we can do, since this whole area is a bowl.

04 20 35 39 CC
Ed, you can go ahead and deploy in accordance with the nominal plans. We understand that will not impact the experiment.

04 20 35 52 CC
*** Houston. Do you copy deploy in accordance with the nominal plans?

04 20 35 57 ICP
Okay. I got you, Bruce. Thank you. Sorry, I was busy - at that moment.

04 20 36 45 CDR
Okay, Houston. To keep you honest, Al is operating in the central station at the moment.

04 20 36 53 CC
Roger, honest Al.

04 20 36 56 CDR
(Laughter)

04 20 39 19 CDR
Okay, up comes the central station. And that's one for the troops on the ground.

04 20 39 27 CC
Okay. We're watching.

04 20 39 30 CDR
Can you actually see it from there?
I couldn't see it move up. I can see something, so to speak, flopping in the breeze. I guess that's the foil.

Flopping in what?

Houston, I've - I'm here having a wrestling match with the SIDE and the CCIG. The SIDE is so light, the cable is sufficiently stiff that every time I touch the CCIG, it almost turns the SIDE over. It's turned it over twice on me now.

Want some help up there, Ed?

Give me another minute with it and I'll have it, I think.

Okay.

Say again on that, Ed.

Say again?

I missed your last.

I said I've been wrestling with the SIDE and CCIG out here. And - the cable is still sufficiently stiff, and the SIDE is sufficiently light and this - is sufficiently a little stiff, that it keeps getting tipped over. ...

Can you do anything by moving it back a little bit toward the central station to slack off the cable?

No, no, no, no. It's the cable from the CCIG to the SIDE.

Okay.

A little hysteresis problem, huh?

There it goes again. Okay, Houston. I think I have it leveled. Besides that, it's poorly balanced, it turns out. It wants to tip over very easily to the rear. The CCIG is aligned and leveled. I mean the SIDE is aligned and leveled; and the corners, I guess I better check those.
Okay, Ed. If you have a problem, SIDE is first priority; CCIG comes second.

Roger.

It's interesting, Bruce, that the dynamics of the SIDE are such that - just pulling this pin on it almost tipped it over again. I had to use a lever technique to get it off.

Okay. The SIDE is deployed - the SIDE is deployed.

Roger. And copy the dust cover is off.

Okay. We'll head back and get on to the thumper geophone.

What's the status of the CCIG, Ed?

It's in good shape. It's deployed about 6 feet to the southeast and pointing almost due south with - a little bit to the west.

Beautiful.

Al, this is Houston. I show about 3 to 4 minutes overdue on the magazine on the 16-millimeter camera.

I was heading for it over there now, Al. I'll turn it off.

Okay. You shut it off, and we'll change the WAG later.

Okay. And, Bruce, I'm going to go to INTERMEDIATE cooling just for a few minutes - for a couple of minutes.

Roger, Ed.

I've got it in between LOW and INTERMEDIATE now.

Roger, Ed.

And I'm going to take the penetrometer measurement, now, Houston, until I get ready for the thumper.

CONFIDENTIAL
That new extension handle works well. And, Houston, I'm taking these measurements now at a site about 15 - about 25 feet south of the central - not of the central station but of the RTG, and here goes my first one. One hand. And, Houston, I can push it in - Well, let's see - it's gone all - nearly all the way in.

Six marks. Six blacks showing.

Six - 1, 2, 3, - 1, 2, 3, a double one and a black and a white. A white, a black, and white below the upper double one. Do you understand?

Roger. We do.

That's with one hand; with two hands, I can push it all the way in.

Roger.

I'll try it once more --

You have about 3 inches left there.

Well, it - it was no problem getting it in, Al. It's my fingers won't reach any further.

Okay.

Okay. Here we go. One - one hand. *** two white and two black rings showing below the upper double ring. Understand? With one hand.

Roger. Understand.

And two hands, all the way again.

Roger, Ed.

And one more. At this site, Houston, I got it all the way to the upper double ring, one hand.

Roger, Ed.

And again all the way in, two hands.
04 20 47 24 CC
And get all ... the geophone deployment.

04 20 47 27 LMP
Roger. And, Houston, I'm back in MINIMUM cooling.

04 20 47 40 CC
Roger, Ed.

04 20 48 03 LMP
That looks like a pretty good line right out there.

04 20 49 04 CC
Honest Al, this is Houston. How are you doing?

04 20 49 08 CDR
Fine, thank you, Honest Abe. I'm in the process of leveling and aligning the antenna.

04 20 49 17 CC
Roger.

04 20 50 07 LMP
Now, let's see what that site looks like.

04 20 50 14 CDR
Okay, the antenna is leveled. ***

04 20 50 32 LMP
Al, you do take a picture down along this line. Do you not?

04 20 50 35 CDR
Yes.

04 20 50 36 LMP
I've got me a site.

04 20 51 35 LMP
And, Houston, I have my first geophone in the ground. And, in this soft ground, they go in vertically without any problem, and they push right on in.

04 20 51 48 CC
Okay, that's the 10-foot one?

04 20 51 51 LMP
That's affirm.

05 20 51 55 CDR
Okay, Houston. The central station antenna is along - is alined. I'm going to turn switch number 1 clockwise and switch number 5 counterclockwise. Are you with me?

04 20 52 12 CC
I'm with you, go.

04 20 52 19 LMP
Okay, Al, will you watch me and keep me honest here?
Just a sec, Ed. Number 1, clockwise. Number 5, counterclockwise. Okay. That's where they are, Bruce.

Roger. Out.

I'm going to start moving out, Al.

Okay. Let me just wait here for you for a minute.

And, Al, for your information, they're receiving a good signal back from ALSEP.

Okay.

See where my first geophone is, Al? Is it okay?

Yes, I'll just - line you, babe; just a sec.

Okay.

Okay, a good line for you is the horizon intersection of that crater rim which is cut of your sight; do you see it?

Yes.

That big intersection there.

Okay.

That's a perfect line for you.

That's where I'm headed.

Yes, beautiful. Okay, Houston, the ALSEP antenna alignment looks good.

Roger, out.

Okay, let's press on with the LR cubed.

And, Houston --

Okay, we've also got the PSE final deployment.

Okay, and we'll do that now.
(Humming) Okay. Pull it - feet out this way. And ... straight; plane ***

Okay, Houston. The second geophone is in. And I was a little bit overly optimistic about the ease with which they could be put in. The tension of the cable is such that it didn't want to allow the geophone to hang straight. Rather the - set in the cable.

The geophone isn't heavy enough to straighten it out.

Roger, Hi.

But we got it in.

This "we" stuff?

That's an editorial we. I was really referring to the end of the --

And are you getting the --

I was really referring to the end of the thumper and me.

Are you getting the second flag in there?

Yes, it's in.

Okay, the final deployment of the PSE gives us a shadow reading of - 093.

093 degrees and level. Over.

093 degrees and level - Make that --

Beautiful.

You can call it 093.5, if you want, Houston.

Roger, out.

And the skirt is all deployed very nicely and level; it's flat all the way around.
Okay, Houston, this is Ed. I'm at the end of my geophone line. Looking back over it, I see that the cable has knocked down the second flag. Do you want me to go back and look at it, or shall we try one shot and see if everything's working?

We'd just as soon go ahead and try a shot and see how it works, Ed. Have you got the third one in the ground, yet?

Yes, the third one's in the ground. Somehow or another, I'm tangled up on this cable. Just a minute. There we go.

Okay. The LR cubed is deployed 100 feet west of the central station. It is level, set index is zero. The cover is coming off, now.

The cover is off.

Roger, Al. And, Ed, this is Houston. Whenever you're ready, we need to get a calibration on the geophone, so if you and Al will just stand still for a moment, then we can give you a GC to commence thumping.

Okay. I'm standing still now.

Okay. The cover is off of the laser, and it's completely clean.

Roger.

And it did not move during the cover removal.

Roger, Al. And if you can do it without moving around, we'd like to get an EMU status report.

Okay. This is Al. 3.75; volume, 0 percent; I have no flags; MIN cooling, and I'm comfortable. Everything is beautiful.

Okay. This is Ed. I'm 3.75; 34 percent. I'm MIN cooling, no flags. Feel great.

Roger. Got it.
Ed, this is Houston. You're GO for thumper activity. We will require that you and Al stop 20 seconds beforehand and let it quiet down. They're very sensitive.

Okay. You're getting them from all three geophones, Houston?

That's affirmative.

Okay. Here goes the first one.

Okay.

Do I need 20 seconds now, Houston?

That's affirmative.

Okay. Started counting.

5, 4, 3, 2 - Start over. 5, 4, 3, 2, 1 -

FIRE. I didn't feel anything, Houston.

Roger, we copy. Stand by.

Ed, I'm going to mosey on back and start taking pictures in the meantime.

Okay.

Ed, this is Houston. We saw an ARM and a DISARM signal on that. We would like for you to attempt to fire squib number 1 again at the same location. Over.

Okay. I haven't moved. Al, if you'll hold your position, we'll give them another go at it.

Okay, I'm steady.

5, 4, 3, 2, 1 -

FIRE.

Okay, we got it that time, Houston.
04 21 07 40 CC
Roger, very good.

04 21 07 41 LMP
Okay, it's a hard trigger, that's all. That was the problem.

04 21 07 48 CC
We copy.

04 21 07 50 LMP
Say again. Okay.

04 21 07 58 CDR
Houston, did you know that - we were filming that last magazine at six frames per second? Did you take that into account?

04 21 08 09 CC
That's affirmative.

04 21 08 11 CDR
Okay, the little indicator --

04 21 08 15 CC
Six frames per second was nominally 16 minutes, and we ran for almost 20.

04 21 08 21 CDR
Okay, the little ball indicator was - indicating empty. Okay.

04 21 08 24 LMP
Hey, Al, I'm ready for another one.

04 21 08 26 CDR
So.

04 21 08 45 LMP
5, 4, 3, 2, 1. Let me try it again.

04 21 09 02 LMP
5, 4, 3, 2, 1 -

04 21 09 10 LMP
FIRE.

04 21 09 14 LMP
A hair trig - trigger, this isn't. Okay - loading again --

04 21 09 20 CC
Okay, Ed. We copy it fired on that one, and we see it -

04 21 09 28 CDR
Okay, Echo-Echo is coming off and Delta-Delta going on.

04 21 09 36 CC
Roger; understand Dover-Delaware is going on the 16-millimeter camera.

04 21 09 42 CDR
Oh, dear (sigh).
Okay, Al, I'm ready for another one. And, Houston, this is - number 2.

It should be number 3, Ed.

Okay, counting from zero, it's number 2. Zero, one, two.

Roger; counting from zero - counting from zero, it is number 2.

All right.

Okay.

5, 4, 3, 2, 1 -

FIRE.

Beautiful, Ed.

Okay.

I'll set photos Juliett-Juliett. Starting frame is 6.

Roger; frame 6, Jogjakarta-Java.

Do you have to be so prosaic?

Okay, Al, I'm ready when you are.

Go ahead.

5, 4, 3, 2, 1 -

FIRE. 1, 2, 3, 4, 5. Besides having a hard trigger, this thing has a pretty good kick to it.

Okay, good shot, Ed.

Kind of like firing both barrels of a 12-gage shotgun at once.

Houston, am I on number 5 now?
That's affirmative. Counting from 1, you're on number 5. Counting from zero, you'd be on number 4. Over.

Okay, give me the count from zero. That's what I'm marking on. Okay, Al, I'm ready.

Okay, from zero, you're on number 4.

Okay, I'm ready, Ed. Go ahead.

I'm not being facetious, Bruce. That's the way it's marked.

Okay, I'm not fighting you.

5, 4, 3, 2 - Let's try that one over, it moved. 5, 4, 3, 2, 1. Okay, let's try it again; 5, 4, 3, 2, 1 - Damn, I didn't get a fire out of number 4, Bruce.

Roger, Ed. Let's go to the next position, next initiator.

Okay. 1, 2, 3, 4, 5. I can't get that one to fire either. Let me try it again.

Okay, Ed. What I meant was the next geophone line station with the next initiator.

Okay. Let me try --

So, using initiator number 5, you'll -

Say again what you want me to do, Bruce - on both number 4 and number 5.

Okay, using your initiator number 5, you are to move on to the next station, which will be the sixth position. 1, 2, 3, 4, 5, 6, and try it again, there.

Okay. Okay.

And, Ed and Al, for your information, you've been out 3 hours and 35 minutes, and you're about 35 minutes behind the nominal time line with a half-hour extension expected.
Roger.

Okay, Al, I'm ready to try it again.

Okay. Go ahead, Ed.

5, 4, 3, 2, 1 - Durn. It just won't fire. I'll try that initiator once more.

Roger; repeat that one, at the same location?

Roger. 1, 3, 4, 5 --

Okay, and hold at ARM for 10 seconds.

Okay, let me reinitiate the ARM. 1, 2, 3, 5, 6, 7, 8, 9, 10 --

FIRE. It won't go, Bruce.

Okay, next igniter, next geophone station.

Roger.

Okay, Al, I'm ready.

Okay, go ahead.

Bruce, is you want a 10-second ARM on this one, or 5?

10 seconds, please.

5, 4, 3, 2, 1 --

FIRE. Got a good one. 3, 4, 5.

Hurrah, we got one.

Hurrah, we got one.

It was afraid not to. I told it I was going to break it in half if it didn't fire on that one. Okay, I'm ready for the next one.

Okay, go ahead.

Okay, here we go.
Ed, this is Houston. We would like you to proceed to the central geophone, that is, geophone number 2; select igniter number 11, or make that igniter number 10 by your count, and fire that one off. Over.

Instead of the one I'm firing right now?

That's affirmative.

All right, just about to push the trigger. Uh-oh, that's what I was afraid of, Bruce. This one's pulled out.

Which one pulled out?

The middle geophone is not in the ground.

Okay; if you can reemplace it, do so.

I shall. This ground is so soft that, apparently, the - just a tug on the cable lifted it right out.

Al, this is Houston. What are you photographing now? Over.

Right now, I'm taking the distance shots back to the LM from the RTG. Getting down to photograph the SIDE.

Roger. Out.

Okay, Houston. Number 11, it is.

Be your igniter number 10, and you're at the second geophone.

Okay, that's affirm. Al, I'm ready when you are.

Go ahead.

5, 4, 3, 2, 1 -

MARK. Good shot.

Roger. Al, you're released from the constraint for - of holding still for a period of time prior
to and after the geophone thumps. Ed must still abide by the 20-second-before-and-5-second-after rule. Ever.

04 21 21 29 CDR  This is Al. I understand.
04 21 21 35 LMP  Okay, Bruce.
04 21 22 10 CC   Ed, this is Houston. We're expecting you to thump at each station from there on in.
04 21 22 19 LMP  Okay.
04 21 22 54 LMP  Okay, Houston, here is number 11 coming up.
04 21 23 07 CC   Roger.
04 21 23 22 LMP  5, 4, 3, 2, 1 -
04 21 23 26 LMP  FIRE. Good shot.
04 21 23 30 CC   Roger.
04 21 23 33 CDR  You should have threatened it earlier in the game.
04 21 23 37 LMP  You're right.
04 21 23 51 LMP  Okay. Number 12.
04 21 24 10 LMP  5, 4, 3, 2, 1 -
04 21 24 14 LMP  FIRE. Good shot.
04 21 24 19 CC   Roger, Ed.
04 21 24 31 LMP  ... the devil.
04 21 24 51 LMP  Okay; number 13, Houston.
04 21 24 55 CC   Roger.
04 21 25 01 LMP  5, 4, 3, 2, 1 -
04 21 25 06 LMP  FIRE. No fire.
04 21 25 10 CC   Okay, Ed. Press on to the next station; the next igniter.
Day 5

04 21 25 15 LMP

Okay.
Are we getting any decent signals back, Bruce?

04 21 25 27 LMP

That's affirmative, Ed.

04 21 25 32 CC

Okay. I'm on igniter 15.

04 21 25 35 LMP

Al, this is Houston. We need to have you stand still again.

04 21 25 40 CC

Okay.

04 21 25 45 CDR

And I - I show that you ought to be on your igniter number 14, Ed. Unless that was the one you last used.

04 21 25 51 CC

Okay.

04 21 26 06 LMP

5, 4, 2, 1 -

FIRE. No fire. Let me try it once more, Bruce.

04 21 26 11 LMP

ARM, 1 -

FIRE. No fire. Okay, I'm moving on.

04 21 26 30 LMP

Roger, move on.

04 21 26 36 CC

Number 15. Okay.

04 21 27 10 LMP

5, 4, 3, 2, 1 -

FIRE. No fire. Want me to press on?

04 21 27 14 LMP

Roger, next geophone, next position; or not next geophone, next station, next - next squib.

04 21 27 22 CC

Roger.

04 21 27 32 LMP

Okay, Al.

04 21 27 48 LMP

5, 4, 3, 2, 1 -

FIRE. Good shot.

04 21 28 08 LMP

2, 3, 4, 5.
Roger, understand good shot on your igniter 17 - 16.
That's affirm.
Okay, number 17.
Okay.
5, 4, 3, 2, 1 -
FIRE. Good shot. 2, 3, 4, 5.
Roger, Ed.
Okay, number 18.
Okay, go ahead.
5, 4, 3, 2, 1 -
FIRE. Good shot. 3, 4, 5.
These latter shots are firing like it's supposed to, Bruce.
Good easy pull and it's not kicking - didn't seem to be kicking quite so hard. Maybe I'm just pushing on it harder.
Okay, Al.
Okay, go ahead.
5, 4, 3, 2, 1 -
FIRE. Good shot. 2, 3, 4, 5.
Roger, Ed.
And we only have one left, Bruce.
Okay, how many positions do you have to go?
Well, I'm on 20, and I'm on my last position. I'm at the last geophone.
Beautiful. Beautiful.

And I'm - okay. What I'm saying is, we got a shot to spare, but we must have had 22 charges.

Ed, this is Houston. We'd like both of you to stand still for a minute here until we get a calibration curve.

Okay.

And bear in mind that you told me that you started with charge number zero. So, zero to 20 is 21 charges, and we come out even.

Yes, I understand that. I've never seen one fire on zero before. Of course, I've never fired flight hardware before.

*** Al, are you both holding still for the calibration here?

Affirmative.

Fans and the pumps are running on our PLSS.

Well, we wouldn't want you to shut those off.

Thank you.

Okay, go ahead with the last shot, Ed.

Okay, here we go.

I'm ready.

5, 4, 3, 2, 1 -

FIRE. Good shot. 3, 4, 5.

Good show.

Okay. Okay, Al has completed the photographic coverage of the ALSEP and - Juliett-Juliett, counter number 34. And would you tell us now how much - Counter number 34, Ed - Would you tell us now, how much longer we have before we have to be back at the MET for closeout?
04 21 34 47 CC  Roger. Counter 34, and stand by.

04 21 34 53 CDR  ... not a bad batting average. Big-league stuff.

04 21 35 04 LMP  I was hoping to get a few more shots off than that.

04 21 35 06 CDR  Okay, we ought to look around the spot for the -
our map. I think we'd better have a little change in strategy here.

04 21 35 25 CDR  Okay, Houston, the switch number -

04 21 35 29 CC  Al and Ed, this is Houston with a one-half-hour
extension. You have 18 minutes until you have to
be back at the MECA.

04 21 35 41 LMP  Eighteen minutes and 30 extension is what we have,
is that correct?

04 21 35 47 CC  That's Roger. You are 3 hours and 56 minutes into
the EVA at this time.

04 21 35 53 LMP  Okay, in that case then, we will arm the mortar
package at this time before we leave. We'll pro-
ceed back along our track getting geology along
the way.

04 21 36 07 CC  Roger. We concur.

04 21 36 11 CDR  Hey. If you wait a minute, I'll come over and
help you with that thing, Ed.

04 21 36 14 LMP  Okay, Houston. Did you copy that switch number 5
is clockwise and safe?

04 21 36 20 CC  Roger. I now copy that switch 5, clockwise and
safe.

04 21 36 30 LMP  Okay, we're going to arm the mortar pack, and un-
lock and pull the safety latch. Hold her down.

04 21 36 51 LMP  ... a place to hold it.

04 21 36 56 CC  Al and Ed, this is Houston. After arming the mortar
pack, we'd like you to proceed back in the general
direction of the LM, and, selecting a suitable area
in route, collect the comprehensive sample and try
to pick up a football-size rock on the way. Over.
Okay, that's our intent, Houston.

I'll give you periodic reports on how much time you've got left until you have to be back at the MESA.

Okay.

***

Okay, it's a little off level, now.

Yes. I'll relevel it after a while.

Okay.

Okay. I'm fixing to relevel it right now.

I'll press on and back and look for a good spot for this - -

Okay. Houston, the safety rods are out of the mortar pack.

Roger.

Al and Ed -

MARK; 4 hours into the EVA.

Okay.

Okay.

With the half-hour extension, we're working into a 1-hour-and-45-minute EVA duration.

Roger.

And, Al and Ed, would you confirm that you have the extension handle off of the thumper geophone anchor?

I will have it when I leave here; no, we don't have it yet.
Okay, Houston, the mortar pack is aligned, with the bubble tangent to the inner ring; and I'm going to arm it now; and it's pointed almost almost due north, a little bit to the west of north. I guess Al's photographs will allow you to get that exactly.

Roger; bubble tangent to inner ring and almost due north.

Well, it's tangent to the inner ring on the northwest side.

Okay.

Both arming switches are on on the mortar pack. Switch number 5 is going back counterclockwise.

Okay, stand clear.

Okay. Switch 5 is armed. Pretty hard to stay 15 feet back when it's --

Okay. You got the safety --

-- 15 feet away when that cable's only 10 feet long.

Roger, we copy. And you got the safety rods, the two switches on the pack, and switch 5. Beautiful.

That's affirm.

And I have the extension handle, and I'm starting out after Alan, now.

Whee. Hey, this is sure a different mode of traveling than carrying that barbell.

Okay, Houston, on this Houston, on this comprehensive sample, we're about a third of the way back to the LM. I've not found an area exactly what I want; so I have drawn a circle which is approximately 2 meters in radius. And I'm going to pick the surface rocks from that and a sampling of the surface fines from that area.
And I've photographically doc - -

Roger, Al.

--- I've documented this location with a locater shot back to the LM and to the ALSEP.

Roger, Al.

Okay, Al. Need some help there?

Yes, I wanted to pick up all the walnut-size rocks in your tongs. And we'll work the surface fines, here.

Why don't you work that - that side of it, and I'll work this side.

Okay.

You have to be careful you don't put them in the ground. If you make consecutive passes up the whole circle, we can tell.

Ok, damn.

Maybe we can only -

Pardon?

For this amount of time, we can really only get the - the ones that are essentially there.

Yes, let me grab another weigh bag, because you're too far away for me to - -

An inch in diameter.

--- Can't help you very well this way. Put something together in a minute.

I think I've got them, Ed.

Okay. I'll get one for the fines.
Get one for the fines and we'll start - I'd just say, just grab an undisturbed site out of each quadrant, we didn't hit with our feet. Cut it down to about a centimeter level - and fill the bag that way.

Okay. You want the medium-size scoop or the big scoop for this?

No, actually - the trenching tool, medium - no, the medium-size scoop is the best. All you've got to do is cut the surface to the depth of about a centimeter in an undisturbed area here - where we haven't kicked up the rocks. Okay?

Okay. *** bringing the stuff over right now. Probably have this done before I...

Al and Ed, this is Houston. We show about 8 minutes remaining until you should be at the MESA to start closeout.

Okay, we will be able to bring the comprehensive sample at that time.

Beautiful.

Hey, here - don't close it; here's one in here for that.

What?

Here's one in here I picked up.

Ok, okay. Dump it in here, then.

Okay. Good.

Okay, I'll start over here in this undisturbed area.

Yes, just get that area and then right here in this area. And fill up the bag to the line. And I'll head on back a little farther and get a football-size rock.

Okay.
Okay. There's some pretty good-sized ones back over in here.

Okay, that's too big. I'll get one that's a little smaller.

Al and Ed, 5 minutes.

Okay. You want to start back now, Ed?

All right, let me get about three more scoops, Al. I can get there before long.

Good.

Okay, Houston, you can see where the - the area where the football-sized rock is coming from. It's essentially two-thirds of the way back toward the IM, from the ALSEP site. The rock appears to have been ejected from the crater which Ed was describing earlier, in his 12:30 position. As a matter of fact, it's going to be the small foot-size - football-sized rock - No, it turned out to be two of them.

Roger.

The second small football appearing on the same crater - from near the same crater.

And, at first glance, appears to be fairly similar color. It's a large hand sample. It's essentially nonvesicular. Just some very small vesicles. The - what appears to be -

Roger. We've got 2 minutes; we'd like to get you on back to the vicinity of the MESA.

- - what looks to be a fairly large crystal in that second small football rock, and Al is starting back toward the MESA, now.

And I'm on my way, too.

Roger.

Okay. Away we go.
The number of surface rocks - or rocks compared with the number of surface fines is very, very small, Houston. It is - There's a few boulders lying around and there's a few rocks around some of the craters; but, by and large, it's a powdery surface. Don't run into that crater, Al.

Don't - don't worry, babe. A little sidewinder action, here.

The old man's traveling pretty well.

Hey, how about keeping your eye on it because - - I am.

Boy, my sample's packing down. It was more than this when I left the site.

Okay, we're coming back down the hill, Houston. Got air brakes going downhill ... - -

Roger, Al. We're seeing you moving across the TV camera, and it looks like you've gotten back to the MESA here with about 10 or 15 seconds to spare on our mark. We do have plenty of time for the nominal closeout; so we don't want you to rush that. Just go through the procedures, and we'll take the timing as it comes. And, when you have a moment, we'd like to get an EMU status report.

Okay.

And since I'm coming by the camera, Houston, I'll turn you around.

Roger. And we'll put the zoom on - zoom on about 4X.

And we go back to average, and f/44.

How's the field of view right now?

It's pretty poor right now.

Okay. Just a minute. Okay.

Switch it to 40.
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<tr>
<th>Time</th>
<th>Identity</th>
<th>Dialogue</th>
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<tbody>
<tr>
<td>04 21 55 03 CC</td>
<td>Okay, can you elevate the camera a little?</td>
<td></td>
</tr>
<tr>
<td>04 21 55 06 LMP</td>
<td>Yes, I'll have to dig in a - leg. How is that?</td>
<td></td>
</tr>
<tr>
<td>04 21 55 13 CC</td>
<td>Very good. Very good.</td>
<td></td>
</tr>
<tr>
<td>04 21 55 15 LMP</td>
<td>Okay. Oh, damn it. There went my sample bags.</td>
<td></td>
</tr>
<tr>
<td>04 21 55 26 CDR</td>
<td>Put your UHT handles through it.</td>
<td></td>
</tr>
<tr>
<td>04 21 55 30 LMP</td>
<td>I'll use the - this handle. Fortunately, I don't think more than a little bit fell out. Okay, we got it packed down to only half full.</td>
<td></td>
</tr>
<tr>
<td>04 21 56 56 CDR</td>
<td>Okay, Houston, for your information, those location - documentary location shots of the comprehensive sample taken on JJ and - I'm now showing 40.</td>
<td></td>
</tr>
<tr>
<td>04 21 57 12 CC</td>
<td>Roger; JJ, 40 for the comprehensive sample area.</td>
<td></td>
</tr>
<tr>
<td>04 21 57 36 LMP</td>
<td>Take that - take that, can you? That's - that's all right; I wanted you to stow that, but your hands are full, too. I'll get it.</td>
<td></td>
</tr>
<tr>
<td>04 21 57 47 CDR</td>
<td>And on the comprehensive sample, Houston, I feel we have about 15 rocks and some fines. One weigh bag is going in the SRC.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 01 CC</td>
<td>Roger. If you take an additional weigh bag and put material from the immediate vicinity of the LM into it to fill up the SRC, we request that you drop a documented sample bag in it as a tag. Over.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 14 CDR</td>
<td>Okay. Okay, I guess we've got a little room to do that. I put the football-sized rocks in the ETB.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 27 LMP</td>
<td>Okay. Let's see, you put a 70-millimeter camera in the ETB?</td>
<td></td>
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<tr>
<td>04 21 58 33 CDR</td>
<td>You want a bag? Yes, it's in there.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 35 LMP</td>
<td>Did you take out the TDS?</td>
<td></td>
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<tr>
<td>04 21 58 39 CDR</td>
<td>No, not yet.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 41 LMP</td>
<td>Okay, it's probably in the bottom.</td>
<td></td>
</tr>
<tr>
<td>04 21 58 42 CDR</td>
<td>Yes, it is.</td>
<td></td>
</tr>
</tbody>
</table>
And, Al, I show that you have a magazine on the 16 millimeter that's totally unused, Dover-Delaware.

It's on the MET, Bruce. It never made it on the camera.

I think Ed put it on.

Negative.

But didn't start it.

Oh, I'm sorry. I take it back; we did put it on.

Okay, where's that good scoop?

Which one, the big one? Why don't you let me help you with the - Let's take the shovel, Al; it'll be faster.

All right.

Trenching tool.

Want to hold the bag?

Yes.

Let's hit that little crater out there. It looks like a secondary.

Okay, let's go get it.

Right out here.

I saw a - saw a little crater about this size out here that I'd swear had glass in the bottom of it, but I was too busy thumping to stop and make any comment on it.

Okay. Oh, God.

There's a little different-colored layer in the bottom of it there.

Yes. Scoop it out. ...
See, there is a different one color down there.

Okay, how does that look to you?

I can take another shovelful.

Okay.

That's good.

Okay. Houston, that's from a small crater; looks like it might be a secondary impact, just hazarding a guess; it's about 2 feet in diameter, and it's - it's between 130, 50 feet, 130, 40 feet from the IM.

And we'll put a documented sample bag in there with it.

Roger. That's the initial — —

We'll put a documented sample bag in there with, and that will be bag number 1. Here you go, Ed. Stick it in there.

Okay, put it in.

One-November, 1-November.

Roger. Out.

Okay. *** and that'll fill up this one - this SRC, and that'll do it very nicely.

Okay. There you go.

Hey, you got her.

Okay. All right, Houston. I'm getting the two used MAGs off the MET. They're going in the ETB.

Al, this is Houston.

Okay, that's too big; stick that in the ETB, also. Go ahead, Houston. Those are the ... rocks — —
Roger, prior to terminating the EVA, on the TV camera, we'll need it set to f/44, peak, and align so that the long axis of the camera is perpendicular to the Sun. We'd also like to move the camera to that, in this orientation, we're still viewing the LM. Over.

Okay. Okay. At f/44, peak, and the long direction normal to the sunline.

Roger.

Al, did you get the - did you get to put the maps in - No, the maps are right here.

No, I haven't done anything yet. I'm just loading the SRC.

Okay.

The 70-millimeter camera in the ETB, and I'm storing - packing the SRC.

Okay.

And, Houston, we were unable to get all of the weigh bags in the SRC. It's full. We're putting the small samples of small rocks from the comprehensive sample in the weigh bag along with the two small football rocks.

Roger. *** the football rocks are in one weigh bag, and you're adding another weigh bag containing the small rocks.

Right, two weigh bags and they're both in the ETB. Get in there, baby.

Roger.

We're going to have to make another ETB load, Al. I've got another 70-millimeter camera to go.

It's not very heavy.

But I'm thinking about volume.
Okay, SRC's closed now. Okay, so SRC, serial 07, Houston, contains, then, the organic control sample, the fines from the comprehensive sample, and the extra fines from that small crater we collected near the LM.

Okay.

We copy those in the SRC.

*** Get the good one off there, okay.

Yes, I got it, Al.

Okay, and the map should be in there --

I've got the map, already.

-- and the lens/scribe/brush assembly.

I'll grab it.

Okay, I'll boot on out here and take care of --

Watch - You're tangled up in the cable.

Okay, 44, peak, normal.

Roger.

Roger, and we might as well go to 25 on the zoom, Al.

I just zoomed by you. Verify 44 --

We saw you zoom by us.

-- 44 on the zoom; I mean 44 on the f-stop; 25 on the zoom - Want - want infinity on the --

Just a minute, Al; I've got to configure one more camera here.

-- infinity on the focus. We're transmitting, and we're in peak, and we're long axis normal to the Sun. How's that?
Roger, Al.

You want the lens cap on or off?

Lens cap off, o-f-f.

O-f-f. Okay, ETB contains two medium football rocks and the small rocks from the comprehensive sample, contains two 70-millimeter CAMs, three 16-millimeter MAGs, map, lens/scribe/brush assembly.

Yes, they're all in there; I just check them.

Good show.

And the SRC number 2 is on the MET.

Okay, let's see if we can get you clean.

Okay, I think that completes my checklist. Watch it. You're tangled up in the cable again --

Roger, copy SRC number 1 sealed.

-- the cable, the cable!

Say again.

Is SRC number 1 sealed, and closeup camera off?

SRC number 1 is sealed.

And verify that closeup camera is off.

Okay, it's going to be a --***--

Brush?

Yes.

Okay.

Coming off.

Okay?
Okay, next. Okay, let's get out in the Sun and see what we can see.

Yes. Do it here. God, it - No, I don't know. Goi, you're a mess.

Oh, it helps.

Yes, it helps quite a bit. I'll just start at the tcp. It'll take a while, but we'll get it there.

Or these gloves, here.

Pardon?

Okay, press on. ***

Get into you connectors, there.

Hey, Houston. How much time do we have to repress, now?

All right, we're looking at 14 minutes and 20 seconds to scheduled end ***

Okay.

We're going to use it getting clean, I think.

Roger. Just do the best you can, and we'll keep you posted.

All righty. Do you ever use soap on your clothes? Bet you been wallowing in them.

Okay, come on around and let me get this other leg. Okay. That's good. Get them off good because you're going to sleep in that hammock over me.

(Laughter) Oh, ho, ho -

Okay. That's it. Turn it around toward me a little bit more. Those overshoes are impossible.

That came off pretty well.
Yes. I think we can do best by kicking them off of those, Al.

Okay.

Because you're just going to get back on as fast as - -

All righty. Turn around and let me get the Sun on you, probably better. Okay. Okay, inside. Okay. Okay on the inside. Okay, you're pretty clean on the torso. Few on the hoses. Not too bad. Most of this stuff seems to be coming off fairly well - -

Yes. It comes off it it's not too much rubbed in; if it's just laying there, it brushes off well.

Okay. You have a UHT still on.

Okay. I'll take it.

Okay. Now I'll add a little. Not much we can do with that. Okay. Yes. That comes - quite a bit of that stuff comes off, especially off the back. That's lot better.

Okay.

Okay, ready?

Wait a minute, I've got a -

Hey, you're in the S-band cable.

S-band cable. Let's - get the inside of you, there. And the other side. Oops. That's the end of that.

Okay.

Okay, we'll put a pair of tongs on that. Did you get it?

No. These tongs will never pick it up. You can help me with it, though.

Okay. Got it.
Okay. All righty, let's press on here. Okay. I want to get this baby out in the Sun.

Lay that right there until tomorrow.

Okay. Caught the cable again. Hold it. Al, hold it.

Holding it.

Go up to -

That it.

I'll go - I'll go ahead and start up the ladder, and you can pass me the ET - pass me the -

Yes. Go ahead.

Ed and Al, Houston. We'd like to get a final EMU status report.

Okay.

This EMU is about 4 feet in the air, right now.

This is Al, 3.75; and I'm reading 40 - 40 percent; no flags on low flow; and I feel fine.

Okay. I'm 3.75; reading 20 percent; and no flags; MINIMUM cooling, and feel great.

Roger. Thank you, Ed.

Got it?

Got it.

Piece of cake.

That EMU falls flat on his back.

*** takes it with you.

How's our buddy the redhead doing, Houston?

I don't think they heard you.
04 22 16 08 CDR  Houston, this is Al. How's our buddy --

04 22 16 09 CC  Oh, yes. We did too, Al. He's doing fine up there taking photographs, and he just passed by you about 10 minutes ago. Over.

04 22 16 19 CDR  Did he ever get his big - Hycon camera fixed?

04 22 16 28 CC  Okay. Negative on the Hycon, and he was able to spot the LM last pass. Over.

04 22 16 35 CDR  Ah, beautiful. Beautiful.

04 22 16 38 LMP  Okay, Houston. I'm at the door, ready for ingress. Getting ready to open the hatch, now.

04 22 16 46 CC  Roger, Ed.

04 22 16 50 LMP  Hatch is open, and I'm ingressing.

04 22 16 58 CDR  Okay, the -

04 22 16 59 CC  Roger. Where's the SRC?

04 22 17 05 CDR  Say again.

04 22 17 08 CC  Did the SRC get up to the platform?

04 22 17 12 LMP  Yes.

04 22 17 22 CDR  The MET is parked in the Sun, 45-degree angle; S-band cover is on it. It looks like it's going to spend the night very comfortably.

04 22 17 38 CC  Roger.

04 22 17 49 CDR  Okay. The TV's ready to go.

04 22 17 54 LMP  Okay. Get mine turned on the lanyard and away we go.

04 22 18 23 LMP  Bum-bum-bum, ba-ba, bum-bum.

04 22 18 28 CDR  Okay. He's coming up on the porch now.
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<tbody>
<tr>
<td>04 22 18 41</td>
<td>LMP</td>
<td>Okay. Right - right up side of the hatch, now. Coming in the hatch. It's all yours. Okay. Do you have it?</td>
</tr>
<tr>
<td>04 22 18 50</td>
<td>CDR</td>
<td>I've got it.</td>
</tr>
<tr>
<td>04 22 18 51</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 22 19 04</td>
<td>CDR</td>
<td>Houston, Al's starting up the ladder.</td>
</tr>
<tr>
<td>04 22 19 10</td>
<td>CC</td>
<td>Roger. Did you get everything in the one ETB?</td>
</tr>
<tr>
<td>04 22 19 14</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>04 22 19 18</td>
<td>CC</td>
<td>Roger. Very good.</td>
</tr>
<tr>
<td>04 22 19 42</td>
<td>CDR</td>
<td>Okay. Al's up at the top of the ladder waiting for the LEC to come up.</td>
</tr>
<tr>
<td>04 22 19 57</td>
<td>LMP</td>
<td>Now, it's up here.</td>
</tr>
<tr>
<td>04 22 19 59</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>04 22 20 12</td>
<td>LMP</td>
<td>Okay. Here's the LEC.</td>
</tr>
<tr>
<td>04 22 20 18</td>
<td>CDR</td>
<td>Okay. Thank you.</td>
</tr>
<tr>
<td>04 22 20 52</td>
<td>CDR</td>
<td>Okay, are you ready for the sample box?</td>
</tr>
<tr>
<td>04 22 20 54</td>
<td>LMP</td>
<td>Yes. Pass it in.</td>
</tr>
<tr>
<td>04 22 20 55</td>
<td>CDR</td>
<td>Wait a minute; I'll give it up to you a little higher.</td>
</tr>
<tr>
<td>04 22 20 58</td>
<td>LMP</td>
<td>Just push it right on in. I've got it.</td>
</tr>
<tr>
<td>04 22 21 02</td>
<td>CDR</td>
<td>Okay, the SRC is in the cabin, Houston.</td>
</tr>
<tr>
<td>04 22 21 07</td>
<td>LMP</td>
<td>And Al will be starting in any moment.</td>
</tr>
<tr>
<td>04 22 21 08</td>
<td>CC</td>
<td>Roger, Al.</td>
</tr>
<tr>
<td>04 22 21 13</td>
<td>LMP</td>
<td>Okay, Al; let me get over behind the door.</td>
</tr>
<tr>
<td>04 22 21 16</td>
<td>CDR</td>
<td>All righty.</td>
</tr>
<tr>
<td>04 22 21 34</td>
<td>CDR</td>
<td>Okay, are you behind the door?</td>
</tr>
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</table>
No, your hoses are in my way. I'm coming around the other d - way.

I had those babies pulled pretty far - pretty far back. I guess they came out again.

Between your hoses and the ISA, which keeps falling off the hook, it's getting pretty messy. Okay, come on in.

Okay, I'm going through the hatch.

Okay. If you'll hold there just a second, I'll clear your antenna.

Okay. Come on through.

All clear?

Yes. Roll toward me; roll toward me. Okay. Come on up. There - turn to your -

Coming around. Okay. Okay. Stand by 1 minute. (Grunting) Get this -

... about it first.

Okay?

Okay, Houston. Al is in the cabin, and PLSS FEEDWATER's coming off.

Okay, Al in the cabin, and PLSS FEEDWATER, off.

And - and Ed's feedwater is off.

Oh, man, I can't get it off.

Roger, Ed.

You want me to get it?

***

Stand up again. There you go, it's ***

Okay.
04 22 23 44  LMP  I'm ready to close the hatch.  *** all the way ***
04 22 23 51  CDR
04 22 23 58  LMP
04 22 24 00  CDR
04 22 24 02  LMP
04 22 24 12  CDR
04 22 24 32  CDR
04 22 24 35  LMP
04 22 24 39  CC
04 22 24 42  CDR
04 22 24 58  LMP
04 22 25 04  CDR
04 22 25 20  LMP
04 22 25 27  LMP
04 22 25 42  CDR
04 22 25 59  LMP
04 22 26 33  CDR
04 22 26 35  LMP
04 22 26 48  CDR
04 22 26 54  LMP
04 22 27 24  CDR

Lean forward and then back in. Harder.
There. Just a -
Okay. The hatch is closed and locked.
In AUTO? I'll get it.
Roger the hatch.
Hatch is closed.
Right. Your hoses were holding me off. I was still -
*** AUTO. Dump valves in AUTO?
Both AUTO. I will verify as soon as I can turn.
I can't - ***
Okay. OVERHEAD DUMP valve in AUTO.

It's just the thing. We'll go to here. LIGHTING: ANNUCIATOR/NUMERICs, BRIGHT. CABIN REPRESS, AUTO.
Circuit breaker CABIN REPRESS, closed. Okay, and cabin's coming up.

Got your circuit breaker in?
Say again.
PRESS REGs A and B to CABIN.
Now, I read you. *** Ready to go on? *** Put the PLSS O_2 off.
Okay. You got your - you got your *** on?
I'll get it for you.

Al and Ed, this is Houston. Over.

Go ahead, Houston.

Okay. PLSS O₂ is off.

We request that you do not break your suit/PLSS integrity until we call you again. Over.

Okay. I'm reading you through the *** Commander.

Yes. I read you. I read you. Hear me?

Yes.

*** minus 6, minus ***

I can't -

We're in CABIN, yes.

Plus *** 77. ***

Reset. Okay, hold the ***, just a little.

***

Ed, this is Houston.

Go ahead.

Okay. Ed, as you may have noticed during the EVA and, in fact, during the predepressurization checklist, your suit leak rate seems to be somewhat higher than Al's, although within the spec. At this time, we'd like you to run through the normal pressure integrity check on your suit/PLSS combination as called out at the 52-minute mark prior to DEPRESS on the EVA-1 card. Al can proceed to reconfigure himself onto the LM ECS. Over.

*** You go ahead. The I'll just *** --

Yes. I'll go here. Okay, cabin's at --
04 22 29 58 LMP  Cabin's at 4.6.
04 22 30 43 CDR  *** do this.
04 22 30 45 LMP  Why?
04 22 30 57 LMP  *** I'm just going to blow mine up here in a
04 22 30 58 CDR  minute.
04 22 31 03 LMP  What?
04 22 31 07 CDR  Go ahead, do it. *** RETURN, AUTO.
04 22 31 10 LMP  CABIN GAS RETURN is AUTO.
04 22 31 35 CDR  *** CIRCUIT RELIEF, AUTO. Shit. Can you move over
04 22 31 45 LMP  a little bit? I'll get it; there we go. SUIT GAS
04 22 31 47 CDR  DIVERTER, PUSH-CABIN.
04 22 31 52 LMP  Okay.
04 22 31 58 CDR  Okay.
04 22 32 07 LMP  Okay. CABIN GAS return's in AUTO; suit *** and
04 22 32 47 CDR  SUIT GAS DIVERTER, PUSH-CABIN.
04 22 32 59 LMP  Okay. Let's get the EVA circuit breakers.
04 22 33 22 CDR  Okay, circuit breakers. Mine are all good.
04 22 33 24 LMP  Circuit breaker okay, Al?
04 22 33 27 CDR  Okay, circuit breakers are verified --
04 22 33 42 LMP  *** finish the rest of it. You can doff your
04 22 33 47 CDR  helmet and *** doff.
04 22 33 40 CC  Hui? Go ahead and doff.
04 22 33 47 LMP  Houston, I'm going back to 57.
04 22 34 00 CC  Say again, Ed.
04 22 34 24 LMP  I'm going back for this ***
04 22 34 47 CDR  Let me see; that's on the second page, isn't it?
That's correct. It's over in the left-hand column.

***52. Okay, PLSS 0₂ coming on. PLSS 0₂ is on.

0₂ and PRESS flags.

Okay.

Push it on down to 10 percent, and my pressure will not - doesn't seem to want to come up.

Okay. Stay in that configuration and stand by a second.

Houston, the air is starting to get a little stale in this suit.

Roger, Ed. Discontinue the check and go ahead with your post-EVA systems configuration.

Okay.

Wait a minute. Let me get your antenna.

Where's my purge valve?

Al, where's my purge valve?

Okay. Put it on the top of the ETB. Okay, you got your purge valve.

Okay, your purge valve's removed.

Okay.

Disconnect OPS 0₂ hose.

Okay. Why don't you turn the fan off here?

Okay, there it goes.

Ed, this is Houston. We'd like to confirm that you have closed the 0₂ valve on your PLSS. Over.

That's affirm.

Roger. Out.
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I'll doublecheck it, Bruce, but - I verify it's closed.

Okay. Connect the LM O₂ hoses.

Okay.

Okay.

Okay.

Got to SUIT FLOW on the ISOL valve. Okay, your PLSS PUMP, OFF?

OFF and OFF.

Connect your PLSS water. Connect the LM water.

*** help me with that water.

Huh?

You're going to have to help me with the water connection. I can't close that one.

Say again?

I said I can't close that one.

Okay.

*** popping this one in for me, too, will you?

Okay. I put that one in.

...

What kind of fitting was in there?

Huh? You stuck this one in that one. Doesn't go very well. Okay, put --

Okay.

PLSS mode, both off, 0.

*** LM water.
CONFIDENTIAL

04 22 46 46  IML  Yes.
04 22 46 47  CDR  ECS: LCG PUMP breaker, closed.
04 22 46 49  IML  Closed.
04 22 46 50  CDR  Okay. Adjust cooling gradually. PLSS mode, both O. Okay. *** in?
04 22 46 52  IML  Okay.
04 22 46 53  CDR  Okay. AUDIO, BIOMED, *** A, RECEIVE; OFF; B, OFF.
04 22 46 55  IML  A, RECEIVE; B, OFF.
04 22 46 56  CDR  ICS/PT - *** And relay off.

04 22 47 00  CC  Antares, this is Houston. Over.
04 22 47 04  CDR  Antares, this is Houston. Been going through the comm checklist. We'd like to leave the S-band TRANSMITTER and RECEIVER in SECONDARY. Over.
04 22 47 18  IML  Okay, will do.
04 22 47 21  CDR  Okay. S-band TRANSMITTER/RECEIVER, SECONDARY.
04 22 47 26  IML  Okay, it's SECONDARY.
04 22 47 27  CDR  VHF, OFF, ON, OFF.
04 22 47 30  IML  Okay.
04 22 47 32  CDR  And OFF, LEFT, HI.
04 22 47 33  IML  OFF.
04 22 47 37  CDR  OFF, ON, OFF.
04 22 47 39  IML  Okay.
04 22 47 40  CDR  OFF, LEFT, HI.
04 22 47 42  IML  OFF, LEFT, HI. You got it.
04 22 47 45  CDR  Okay; RECORDER, OFF.
EVA-2 PLSS COMMUNICATIONS TO POST-EVA-2

05 10 35 57  LMP  -- VHF antenna to EVA.
05 10 36 --  CDR  *** Connect to PLSS comm. AUDIO C ***
05 10 36 --  LMP  All right, Houston, I'm going to comm now - to PLSS comm.
05 10 36 --  CDR  Okay. *** A. Now we - we're right. Okay *** PLSS mode, A, counterclockwise. Tone, on; vent flag, P; PRESS flag, 0; O₂ *** PLSS O₂ pressure gage. Put *** on A.
05 10 36 36  LMP  Okay, there I am, mode A.
05 10 36 --  CDR  Okay, read you loud and clear.
05 10 -- --  LMP  *** loud and clear. A ... PRESS flag, 0.
05 10 -- --  CDR  Okay.
05 10 -- --  LMP  Yes.
05 10 -- --  CDR  ***
05 10 -- --  LMP  *** I'm reading ...
05 10 -- --  CDR  Leave your antenna in, and I'll --
05 10 -- --  LMP  Yes, I'll just leave it in.
05 10 -- --  CDR  Say again?
05 10 -- --  LMP  Leave it in.
05 10 -- --  CDR  And I'm going to PLSS comm. ***
05 10 38 58  LMP  Okay, and I'll pull mine. Okay, they're off.
05 10 39 19  CDR  Flag P; PRESS flag, 0; O₂. ... and tones.
05 10 39 33  LMP  Okay, I read you loud and clear.
05 10 39 37  CDR  Roger; and my PLSS O₂ is reading 85 percent.
05 10 39 40 LMP Okay, I go B. You go A.
05 10 39 43 CDR Okay. Now. Do you read?
05 10 39 50 LMP Loud and clear; how me?
05 10 39 51 CDR Loud and clear.
05 10 39 52 LMP Okay.
05 10 39 53 CDR Both AR. Okay, to AR.
05 10 40 03 LMP Loud and clear; how me?
05 10 40 04 CDR Read you loud and clear. And I have a tone.
05 10 40 06 LMP And, Houston, how do you read Ed?
05 10 40 11 CC Ed, I read you loud and clear.
05 10 40 14 LMP Okay, Fredo. And I have an O - PLSS O2 quantity of 87 percent.
05 10 40 32 CDR And this is Al with a PLSS O2 quantity of 85 percent. How do you read?
05 10 40 40 CC Al, we copied the quantity and you're coming in loud and clear.
05 10 40 44 CDR Okay, we're proceeding with final systems PREP. Okay. Verify CABIN REPRESS ECS breaker.
05 10 40 52 CDR/LMP Closed.
05 10 40 53 CDR SUIT FAN DELTA-P, SUIT FAN 2; open.
05 10 40 54 LMP Okay.
05 10 40 57 CDR Okay, we got a caution?
05 10 41 00 LMP Yes - Wait a minute. We do not have a caution yet.
05 10 41 13 CDR It'll take a little while. In the meantime, go ahead, SUIT GAS DIVERTER, PULL-EGRESS.
05 10 41 19 LMP Okay, SUIT GAS, PULL-EGRESS.
05 10 41 22  CDR  CABIN GAS RETURN, EGRESS, and SUIT CIRCUIT RELIEF, AUTO.

05 10 41 29  LMP  EGRESS, and SUIT CIRCUIT RELIEF, AUTO.

05 10 41 33  CDR  Okay, while we're waiting for the caution and warning, come turn around and I'll unstow your OPS - O\textsubscript{2} actuated - if you'll bend forward slightly.

05 10 42 13  CDR  Okay. All your flaps are snapped. No Irish pennants. And the actuator is on, connecting it to the RCU. It's connected. And you can put your ISOL - SUIT DISCONNECT - I can get it for you.

05 10 42 45  LMP  Okay.  ***connect the LM O\textsubscript{2} hoses; let me get those.

05 10 42 49  CDR  Off, it is off.

05 10 43 03  CDR  What's off?

05 10 43 08  LMP  That is off. Okay, there's - -

05 10 43 09  CDR  ECS, yes, and WATER SEP. Okay.

05 10 43 11  LMP  Okay, connect the OPS O\textsubscript{2} hose. Blue to blue.

05 10 43 13  CDR  Blue to blue and locked.

05 10 43 28  LMP  Okay. Okay, *** retrieve purge valve.

05 10 43 30  CDR  Hey, I have one.

05 10 43 38  LMP  ... LO.

05 10 43 42  CDR  ... Okay, you're locked.

05 10 43 45  LMP/CDR  LO.

05 10 44 15  CDR  Okay.

05 10 44 17  LMP  Okay.

05 10 44 23  CDR  FGA DIVERTER valves, vertical.

05 10 44 27  LMP  *** vertical.

05 10 44 31  CDR  Okay.
... and repeat. Okay.
Right here.
Unstow OPS $O_2$ actuator. ... are coming forward.
Connecting it. Okay.
Okay. SUIT ISOL valve to DISCONNECT. I got it. Okay.
Actuator to RCU SUIT ISOL valve.
Got that.
Connect $O_2$ hoses.
Okay.
Okay, connect the OPS PLSS with the blue and lock.
Okay.
Locked. *** your purge valve.
Locked and LO.
LO. A, in locked.
Okay, it's locked. The lockup lock's locked.
Okay. DIVERTER valves, vertical.
Vertical.
Verify items prepared for jettison: ECS LiOH cartridge and brackets - it's in there. Hammocks, PLSS batteries and LiOH cartridges. Waste, bags.
And drink.
Okay. Shut off the DESCENT WATER valve.
WATER valve, CLOSED. Okay, just like that. Watch your set. And strap's set.
Okay, PLSS fan, ON; vent flag, clear.
05 10 47 49 LMP Far, ON.
05 10 47 54 CDR Vert flag, clear.
05 10 47 56 LMP Vert flag, clear.
05 10 48 02 CDR Okay, you ready for your helmet?
05 10 48 03 LMP Yes.
05 10 48 24 LMP Get all the stuff up. Get that?
05 10 48 26 CDR Just a minute. This ...
05 10 48 35 CDR Okay.
04 10 48 37 LMP Okay.
05 10 48 45 CDR All righty.
05 10 49 22 CDR Okay, I believe that's good.
05 10 49 24 LMP ... Locked?
05 10 49 28 CDR You're locked.
05 10 49 29 LMP Great.
05 10 49 52 CDR Hey, can you see your controls?
05 10 49 53 LMP Yes.
05 10 49 55 CDR Mine?
05 10 49 57 LMP Yes.
05 10 49 58 CDR Okay, your LEVVA is installed. Check your drink bag position.
05 10 50 11 LMP ... you're pressurized. Okay, can you reach it?
05 10 50 16 CDR Yes, I got it.
05 10 50 28 LMP Okay. ...
05 10 50 52 CDR ... Yes.
Cobra cable's coming out.

I think it made it in the back. Here we go.

Sounds better. Okay?

It's latched.

Bags.

Right here.

Let me look behind now. You look at the other side. Yes, I was afraid of that. Okay, now you're all tucked down.

Okay, LCG is positioned as required; open the LCG PUMP breaker.

Let's take a shot of cold air and chill down, if you don't - cold water ...

Yes. Do you want me to go ahead and disconnect my -

Okay. Okay.

Okay, go ahead. I'll be putting these hoses in the back, here.

Okay. You track it, and then, from those, you hook it up while you're at it. I'll hold it for you. Go ahead.

Okay. I think - that ought to do it.

...

Okay.

*** there. It went. Can't do two things at once.

Get it locked?

Yes.

Sure? It didn't feel like it. Okay.
05 10 54 46 CDR  Okay, you ready?
05 10 54 48 LMP  Okay, LCG PUMP, opening.
05 10 54 51 CDR  Okay. Here, I'll get this.
05 10 54 59 LMP  Okay. ...
05 10 55 34 LMP  Here, I'll get them for you.
05 10 55 46 CDR  Okay, you're locked.
05 10 55 49 LMP  Okay, verified. Helmet and visor, alined and adjusted.
05 10 55 58 CDR  They are.
05 10 55 59 LMP  Okay. Torso tiedown and adjusted. I'm going to pull it down a little bit more today - this stiff suit's not quite tight enough.
05 10 56 35 LMP  Okay, O₂ connectors, three.
05 10 56 38 CDR  Turn around. They're locked; red locked, blue locked.
05 10 56 44 LMP  Purge valves, one.
05 10 56 46 CDR  Purge valve's locked.
05 10 56 47 LMP  Water connector, one.
05 10 56 49 CDR  Water connector's locked.
05 10 56 50 LMP  Comm connector, one.
05 10 56 52 CDR  Comm connector's locked.
05 10 56 53 LMP  Okay, do it for me.
05 10 56 57 CDR  Okay, helmet and visor, alined and adjusted.
05 10 57 00 LMP  Do you verify that?
05 10 57 01 CDR  My torso tiedown is okay. Three O₂ connectors?
Okay, three O\textsubscript{2} connectors, verified locked, and lock locked.

One purge valve.

One purge valve, in, and lock locked.

Water connector.

Water connector.

And comm connector.

Locked and locked.

Take a look at the EVA circuit breakers.

Okay. Wait a minute. Hold it. Let me move there.
Move the little container here. Okay, EVA circuit breakers.

Okay. They're verified.

Mine are all verified. Let's don EV gloves.

Okay. Bring your ring around a little bit.

I think that did it. Now try it.

No. Something's catching on it, Al.

*** it off.

Huh?

*** it off?

Yes. *** perfectly straight ... this time.

That felt good.

*** go in here.

Okay. Got it.

Okay. Four wrist locks locked; glove straps adjusted. Verify PLSS DIVERTER in MIN.
05 11 02 33  LMP  Okay.  DIVERTER in MIN.
05 11 02 34  CDR  And PLSS pump, ON.
05 11 02 36  LMP  Pump, ON.
05 11 02 38  CDR  Okay. PRESS REGs A and B to EGRESS.
05 11 02 50  LMP  Okay. Thank you. Okay. PRESS REGs A and B.
05 11 02 53  CDR  PRESS REGs A and B to EGRESS.
05 11 02 58  LMP  PRESS, EGRESS.
05 11 03 02  CDR  Okay. Pressure integrity check. Turn your PLSS
02 ON. Should get tone. 02 flag, 0.
05 11 03 14  LMP  02, ON. There we go.
05 11 03 17  CDR  Go?
05 11 03 18  LMP  Flag, 0.
05 11 03 19  CDR  Flag, 0.
05 11 03 21  LMP  There's the tone. 02 flag, 0.
05 11 03 26  CDR  PRESS flag, feed.
05 11 03 31  LMP  PRESS, 0.
05 11 04 06  CDR  PRESS flag cleared, 3.1.
04 11 04 08  LMP  And mine's cleared.
05 11 04 10  CDR  Okay.
05 11 04 19  CDR  And I'm stable at 3.7.
05 11 04 20  LMP  I'm not quite there yet. Okay. There it is.
05 11 04 27  CDR  And the 02 flag is clear.
05 11 04 29  LMP  Mine's clear. My 02 is off.
Okay. And we're stabilized at 3.7. And O₂ coming OFF.

Okay, Houston; 0.22 drop on the LMP and 0.15 drop on the CDR. Okay. PLSS O₂, ON.

Okay, PLSS O₂ is ON. And O₂ flag, clear; tone is on.

Okay. And the pressure is back up to 3.7.

Okay. And, Houston, we're ready for CABIN DEPRESS.

Okay. We're GO, Ed.

Okay. Okay. Circuit breaker ECS CABIN DEPRESS, open.

CABIN DEPRESS breakers, open.

And CABIN DEPRESS valve, CLOSED.

It's CLOSED.

Okay. I'll get the --

Forward or the overhead?

I'll get the forward.

Okay.

Okay. Going down.

Okay. We're going to drop - go to AUTO at 3.5.

Coming down.

Okay. There's 4.5. 4. 3.5.

Okay, we're back in AUTO. Cuff gage reading 4.9.
Day 6

05 11 07 33 LMP And so is mine.

05 11 07 36 CDR Okay.

05 11 07 37 LMP Okay.

05 11 07 40 CDR Cabin at 3.5.

05 11 07 41 LMP That's verified.

05 11 07 43 CDR LM suit, 3.6 tc 4.3.

05 11 07 44 LMP That's at 4.5.

05 11 07 45 CDR And PGA is greater than 4.8, and it's coming down.

05 11 07 50 LMP And mine's coming down. Okay. Start the wristwatch.

05 11 07 55 CDR Okay, Houston. Time zero -

05 11 07 56 CDR MARK.

05 11 08 01 CC We got it start.

05 11 08 04 LMP *** time zero. Open the -

05 11 08 07 CDR Coming open.

05 11 08 20 LMP *** 2 pounds.

05 11 08 22 CDR Okay.

05 11 08 43 LMP One pound.

05 11 09 13 LMP Four-tenths.

05 11 09 16 CDR Okay.

05 11 09 30 LMP Okay. *** give it a try.

05 11 09 44 LMP Okay. Water flag A.

05 11 10 24 LMP Okay. Turn PLSS FEEDWATER, on.

05 11 10 42 LMP FEEDWATER, on.
Can you get the --

Pardon.

Can you reach the feedwater for me?

Yes. Okay. Just a second. Let me --

Okay.

Okay. *** get a water flag A?

And mine is cleared.

Already clear?

Yes. Well, we used them yesterday. It shouldn't take too long.

Okay. I've got PREAMPs and on ECS light. Better - SEP COMPONENT light is on. Switch the lighting to the ANNUNCIATOR/NUMERIC DIM position. And I'll start the DET. Okay. Oh, I think I see what my suit problem is, Al. I've got a broken cable in my wrist.

Oh, really?

Yes. See, I -- I can't control the right hand.

***

Keeps pulling back to the inside of me.

Pull it there?

I can pull it, but I can't turn it this way and make it stay there. See, it's doing it by itself.

Okay. We have both water bags clear. Hatch is coming open. And you want to get my antenna on the way out?

Roger, Al.

Yes.
Okay.

Okay. Watch the hatch cover. Kick it closed with your knee - I mean the handle cover.

Okay.

Okay. You're going to have to lean toward me.

All right.

You're hung up on the purse. There you go.

Coming over your way.

Okay. Okay. Now hold it while I get your hatch - I get your antenna.

Okay. You're GO. Go right on out.

Back straight on out. Now you're in good shape.

Okay, Houston. Al is on the porch.

Okay. I'm ready for jettison bag, Ed.

Okay. Let me get my checklist open here.

Okay. Got it.

And it's clear.

Okay.

Wait, I'll come down and get it.

That's all right.

Just hand it to me. I'm right here.

Okay.

Okay, Houston, Al's on the surface.

Roger, Al.
05 11 17 07  LMP  Al, the LEC's --
05 11 17 08  CC  And we got a good picture here, and we just saw you hop off.
05 11 17 11  CDR  Okay.
05 11 17 12  LMP  And the LEC's ready to - the ETB's ready to come down.
05 11 17 28  LMP  Wait a minute. Let me get a little tension on it. Okay.
05 11 17 33  CDR  Okay. Coming down.
05 11 17 53  CDR  Okay. Slow it just a sec.
05 11 17 57  LMP  Okay.
05 11 18 00  CDR  Okay. I've got it.
05 11 18 02  LMP  ***
05 11 18 05  CDR  Let it go.
05 11 18 07  LMP  I'm checking the circuit breakers.
05 11 18 57  LMP  Okay. Houston, I'm about ready to egress.
05 11 19 17  LMP  Houston, Ed. Do you read?
05 11 19 20  CC  *** Ed. You're cleared to come out.
05 11 19 24  LMP  Okay.
05 11 19 52  LMP  And, Houston, Ed's on the porch. Starting down the ladder.
05 11 20 20  LMP  Well, it's nice to be out in the sunny day again.
05 11 20 23  CDR  Yes, it's a beautiful day here at Fra Mauro Base. Not a cloud in the sky.
05 11 20 29  CC  The Sun ought to be a little higher today.
05 11 20 33  CDR  Yes, going on oxygen today.
05 11 20 38  LMP  Beautiful day for a game of golf. Okay.
<table>
<thead>
<tr>
<th>Time</th>
<th>CDR</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 11 21 18</td>
<td>CDR</td>
<td>Ed, I started to get a picture of home sweet home right straight up there.</td>
</tr>
<tr>
<td>05 11 21 23</td>
<td>LMP</td>
<td>Yes. Could you undo my EVA antenna, please?</td>
</tr>
<tr>
<td>05 11 21 28</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 11 21 42</td>
<td>CDR</td>
<td>Okay, you're now undone.</td>
</tr>
<tr>
<td>05 11 21 44</td>
<td>LMP</td>
<td>Okay. I've been undone before.</td>
</tr>
<tr>
<td>05 11 21 50</td>
<td>CDR</td>
<td>I really like this.</td>
</tr>
<tr>
<td>05 11 22 00</td>
<td>LMP</td>
<td>Ah?</td>
</tr>
<tr>
<td>05 11 22 01</td>
<td>CDR</td>
<td>Yes.</td>
</tr>
<tr>
<td>05 11 22 02</td>
<td>LMP</td>
<td>One more problem here. My gold visor's caught. I can't seem to --</td>
</tr>
<tr>
<td>05 11 22 11</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 11 22 12</td>
<td>LMP</td>
<td>-- pull down.</td>
</tr>
<tr>
<td>05 11 22 21</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 11 22 23</td>
<td>LMP</td>
<td>In there. Thank you. Want some help?</td>
</tr>
<tr>
<td>05 11 22 26</td>
<td>CDR</td>
<td>No, it's okay. All righty.</td>
</tr>
<tr>
<td>05 11 22 30</td>
<td>LMP</td>
<td>Okay, we're all set.</td>
</tr>
<tr>
<td>05 11 23 17</td>
<td>LMP</td>
<td>*** two spares right up here.</td>
</tr>
<tr>
<td>05 11 23 24</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 11 23 26</td>
<td>LMP</td>
<td>They fit up there okay.</td>
</tr>
<tr>
<td>05 11 23 58</td>
<td>CDR</td>
<td>Watch your foot. Back up.</td>
</tr>
<tr>
<td>05 11 24 07</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 11 24 11</td>
<td>CC</td>
<td>*** pretty neat jig there.</td>
</tr>
</tbody>
</table>
Yes.
Okay, while you're down there, pick up the handle. Okay, very good.
You able to read it?
Okay, I think so, after we *** it off a little.
*** it off, baby.
Easy.
Here, you want the brush? ... Get a clean little brush out of there.
Just turn it over.
Little things proceed to eat your time line up.
And, Al and Ed, we've got about 10 minutes left now to complete the MET load.
Okay, Fredo. It'll be completed easily in that time.
*** good. We're going to need all we can get.
Okay. In accordance with your desires, we are leaving the organic sample out of SRC number 2. Is that correct?
*** No. That isn't the sample he referred to, I don't believe. Sample underneath the IM.
*** Al.
*** did you read, Houston?
Okay, Albert, continue as normal now.
Okay.
Oh, you son of a gun. Oh, this is going to jerk that cable out yet.
Okay. Let's run over the MET stowage. We have the BSLSS --
- - extension handle, and two pairs of tongs. Okay, we have two core-tube cap assemblies. We have tether and gnomon. We have a hammer, we have a small scoop, six core tubes, 35-bag dispenser, trenching tool, a 16-millimeter camera, and - May I have that lens brush again, please?

Okay. Thank you.

Can load up a MAG right here if we want.

Okay. I'll have some MAGs in a minute.

Good. There you got it.

Houston, on the 16-millimeter, we're putting magazine Hotel-Hotel.

*** Al. Hotel-Hotel.

Roger.

Can I help you there?

No. I'm getting it.

*** yet?

Yes, there's some more in there. And, Houston, on the 16-millimeter MAGs, I put Foxtrot-Foxtrot and GG, George-George, in the *** I'm putting - -

*** Ed.

- - Hasselblad Kilo-Kilo on the MET storage area.

Roger. Kilo-Kilo Hasselblad MAGs.

Yes.

I've got the closeup camera turned on. Is that all the MAGs?
There's one more Hasselblad back there.

Okay, there's an extra - 16-millimeter going in here.

Okay. We have 16-millimeter camera, and two and a half magazines, two SESCs and MSSC, two 70-millimeter cameras, and one extra magazine black and white, and we have a partial magazine of color. Closeup camera's turned on, and we need some more weigh bags.

Have you gotten the polarizing filter and the TDS yet, Al?

The polarizing filter is - is - is already in, and the TDS, I'll be getting now.

Okay. So it looks like the MET stowage is complete. Let me look over my list. 70-millimeter MAGs -

Negative. We need some more weigh bags.

Okay.

Roger, Al and Ed. I show you short the weigh bags, MESA brush, and a map.

Okay. The MESA brush is there and the map is there.

Okay. Here we come.

*** close that.

Okay. The TDS sample is on.

Okay. And we need two weigh bags on.

That's all the weigh bags we have there.

Pardon?

That's all the weigh bags we have there; we have two more in here.
Okay. We have a total of four.
Why don't we get them stowed on outside then.
Okay. Why don't you put this one on the back?
And I'll put this one down here.
Okay, the MET's loaded, Houston.
Roger, Al. The MET is loaded.
Okay. We'll go to pick up the -- LPM right now.
- - LPM; and then, we'll move the television camera after that.
Just watch your cables ...
Okay. We're right about on the time line.
Got it?
Okay. I got it.
Okay. *** the cable.
It'll go around the S-band.
You really look neat there.
Say again.
I said that really looks neat. I can see it bouncing a little bit --
Yes, it bounces a little.
- - and your tracks are quite visible.
Okay, up on top of the hill.
And it's very level there.
Okay. The pallet's removed; the thermal cover is replaced.

And, let's do this slow.

Okay. It's all yours.

Okay.

Wait, I'll give you a little more slack. You up there?

Yes.

201 in the Sun.

Okay.

Got it?

Okay. All right, we'll take off the electronics package. Throw away the caging device.

High scale, ON.


Houston, you wanted LPM temperature. It's 125.

*** Ed. 125.

Okay. Okay.

All right. And, Houston, the LPM is loaded on board the MET. I'll start on out, if you want to turn the camera around.

Yes. I just wanted to give - get a good - direction. Actually, our sight to A, directly toward the center of the crater - -

Yes, that's right over that way.

And it's - *** - about 350 meters, a thousand feet.

Okay. We'll start off that direction and take a look around.
Okay, and I'll aim the camera toward Cone.

Okay.

Okay, Houston. We're going to try to put the TV camera in the shade, aim it up toward Cone. Not sure we're going to be successful in doing that.

Okay, Al. We don't want to tarry too long on that one. We're about 2 minutes behind starting out.

***

You can leave them just as they are right now.

Say again?

The settings that are on the TV are - right now, are good.

You don't want to aim it toward Cone Crater?

***-ive, Al. You can do that task, but we won't worry too much about fineness on aiming it. The settings on the camera right now should be good.

Okay. We'll aim it up toward Cone. It's going to be fairly close to the Sun. We'll see what happens.

*** Al.

Do you have the image of the Sun yet? Do you have the image of the Sun yet?

Okay. We have a little bit of a glare in there, but we have a picture, Al.

I'm going to bring it a little further to the right. How's that?

*** Al. We can see the slope - flank of Cone coming in.

Okay. Okay, you're looking at Cone.
Roger, Al. We have little bit of a glare across the center; but in the background, we can see the crest of Cone.

Okay. Okay, we'll probably be off the camera to the right.

*** ought to check our position right about here, Al. See if we can find out where we are.

Okay. While you're checking your position, I'll be using the closeup.

Okay. Taking the picture of the MET tracks, Houston. With the closeup and the Sun angle's ---

*** Al.

*** at 11 o'clock.

Okay, 30, one, and two. My track's at 11, 333, and 4; footprints, Sun at 10 o'clock.

*** Al. I copied the frame numbers. And we still have you in the picture.

Okay. Head on out, man.

Yes, let's go.

You get it?

I don't know exactly where we are.

Well, keep the map in your hand ---

Right.

--- and keep going. I got this.

If I can locate a familiar crater.

Okay, Houston. We're headed just about toward the center of Cone Crater.

Okay, Al. Is this North Triplet right here to --- our right? It is, isn't it?
Yes, sir.

Okay. This nice big depression over here.

Houston, we're again proceeding directly toward the center of the crater, point A. As Ed pointed out, we're passing north of North Triplet. The area over which we are passing again, of course, is pockmarked by craters. However, the land is generally flat right here. We have a -- sort of a -- I was going to say mesa, but I really don't think it's a mesa. It's more of a ridge, which extends to the southeast, almost normal to our path of travel. I think point A is probably down in that valley.

Yes. Look, Al. I've spotted it. See the crater almost directly up front from us, in the valley? Right in the middle valley?

Right.

That's Weird.

Okay.

We head to the north of that, we're in business.

Okay. That means that point A is, in fact, right in the valley.

Roger, Al.

The -- There seems to be quite a few large rocks as we progress along here. *** rocks of up to 2 or 3 feet in size, and one would -- would fairly easily postulate these came directly from Cone Crater. Of course, we will -- get samples of these a little further along.

A little further to the left. Okay. Point A, Al, is right -- it's not quite in the valley. It's right beyond over here.

Okay. *** fairly subdued craters now.
Yes. Okay, this chain that we're going through right here --

Is there any basic change in the -- any basic change in the surface texture as you're heading out across toward A, there?

No. It looks all the same, Fredo. We're -- Fredo, see the crater --

*** what I was afraid of.

See the crater 60 meters to the west of point A? The fairly sharp one?

Roger, Ed.

Okay. We're coming up on that one right --

I think I have it on the chart.

Okay, we're coming up on that one right now. It's the sharper one in the east, north-south line of about three craters. And our traverse, supposedly, passes right between them. Got it?

Okay. We got you right on the map, Ed.

Okay. The -- the kind of Doublet Crater, supposedly just south of our track at 71 and CT, and CT 0.3? We're passing exactly on the south rim of those two, now.

Roger, Ed.

Probably A right here, is it not?

It's right over here to our left a little bit, Al, I believe. Now, let me see. A is right beside a --

And one other question from here. Did the blocks you described as you moved across there, do they appear to be in the form of rays from Cone or are they pretty widely spread?
05 11 53 06 CDR/LMP  No.
05 11 53 07 CDR  We don't see any ray pattern, I would say. They're fairly generally scattered.
05 11 53 20 LMP  Fred, right here in the center of these three for A. Okay.
05 11 53 30 CDR  Buy that?
05 11 53 32 LMP  Well, it's pretty close. I don't think it's exactly at A, but it's close. Real confusing. This --
05 11 53 39 CC  Okay, I'll - clock you at A, right now.
05 11 53 42 LMP  Okay. That large crater to your right, Al, just doesn't snow up. Aha! It does, too. That's the one. Just beyond that is A.
05 11 53 54 CDR  That's what I thought. Right about 20 feet ahead of me, right?
05 11 53 57 LMP  Yes, yes.
05 11 53 58 CDR  Okay, babe. Fred, the surface, here *** talk about that, is - is textured. It - it is, of course, a very fine grain dusty regolith, much the same as we have in the vicinity of the LM. But there seem to be small pebbles - more small pebbles here on the surface than we had back around the LM area. And the population of larger rocks, perhaps small boulder-size, is more prevalent here. Okay, this is probably pretty good.
05 11 54 30 LMP  Yes, this is a good place for A and y'all might also comment, Fredo, that the - they have an appearance, here, quite often like raindrops - a very few raindrops have splattered the surface. It gives you that appearance. Obviously, they haven't; but it's that sort of texture, in places.
05 11 54 50 CDR  Yes, I think - I was - I was just about to say that there's a relationship between the texture and these small surface pebbles. Okay, point A.
Okay, at point A, we do a double-core LPM. I'll start with the LPM and a pan.

Okay, I'll start with the TDS.

Fred, did you read? We're proceeding as written on the checklist.

Roger, I copied - I copied all of that.

The point where we're sampling is - just about in the center of three craters of almost equal size. I would say, perhaps, 20 meters in diameter. The ones to the north in *** are more fresh, more sharp; the one to the left is more subdued. I'm pretty sure we're just about where point A is on the map; it fits ***. Well, it fits the description of it.

Okay. In the TDS, Houston; serial number 1002.

And the frame counter on the closeup is now 305.

Roger. Serial number 1002 and 305.

Roger. And I'm now dusting that sample.

*** remark before I start, that number 3 block on this sample appears to have a smudge on it, before I start - a very light black smudge.

Okay. We copied, Al.

Okay.

Okay, Fred. The LPM is in place; I'm level - It's leveled and aligned, and I'm returning to the MET.

Okay. Give me a call when you get there, and I'll start the timing.

Okay. I'm here now.

Starting the clock.

Okay. May I get a Hasselblad?
Sure. You may have a Hasselblad. What would you like?

I'll take mine, if you don't mind.

Okay, Senor.


And, Houston. The locater shot for the placement of the MET - of the LPM is frame 7, magazine MM. I'll take two of them.

Roger. And, you can go with reading.

*** I took two shots of that for your locators.

*** Ed. And we're GO for the readings.

Okay. Be there in just a second. Fredo? Okay. I'm on high scale.

Go ahead, Ed.

X is 9.6, 54.2; Z, 7.3; X, 9 point --

Okay. Copied.

-- 9.6; Y, 3.8; Z, 6.7; X, 9.6; Y, 3.7; Z, 6.5.

Okay. I got all - all readings, Ed.

And that was the high-scale reading.

Roger. High scale.

And now verifying the second TDS, serial number 2001.

Okay, Fredo, I'm leaving the LPM number 2, and --

Okay. Let me know when you're back at the MET.

Okay. Just a second. I wanted to tell you that, in my leveling of these things, the bubble is tangent to the inner circle to the north, on both the first and the second - alignment.
05 12 03 00  CC  Roger. Copy, Ed.
05 12 03 06  LMP  *** I'm back at the MET.
05 12 03 13  CC  And the clock is starting.
05 12 03 17  LMP  Okay.
05 12 03 27  CC  And, while we got a few seconds there, Ed. The raindrop pattern you mentioned, was it - is it pretty general or is it just here and there that you noticed this texture?
05 12 03 38  LMP  No, it seems to be fairly general, Fred.
05 12 03 52  CDR  Okay, Houston, the TDS sampling is complete, and the final counter, closeup, is reading 311.
05 12 04 06  CC  Roger, Al. I copied on 1001, serial number final count, 311. And Ed, you can - you're GO for the readings.
05 12 04 16  LMP  Okay.
05 12 04 24  CDR  Get in there, baby. Okay.
05 12 04 26  LMP  Okay, Fredo. On high scale again; X, 01.1 - Hold it.
05 12 04 44  CDR  I'm holding it. Oh, okay.
05 12 04 48  LMP  Roger. You bumped the MET. I was afraid you were going to turn it over. X, 1.1; Y, 3.7; Z, 4.0; X, 1.1; Y, 3 point - No, Y is 4.0; Z, 3.7; X, 1.1; Y, 3.9; Z, 3.6. Over.
05 12 05 40  CC  Okay, Ed. We've got all of your readings.
05 12 05 44  LMP  Okay. Returning to the third one.
05 12 05 48  CDR  Okay, I got closeup shots: 12, 13, and 14; and 12 - all at 9 o'clock shadow; 12 and 14 are two typical examples of the raindrop-textured pattern which Ed - of which he spoke. Now, 13 is a picture of a foot track - -
05 12 06 10  LMP  ...
- foot track in the same - area.

And I see some - -

Roger, Al.

I see a fairly large rock here at the - at the north of these three craters. It's embedded right at the rim. It's about 2 feet long. I can see some crystals in it. It has a good fillet pattern. I'm shooting a closeup of that. And the Sun angle again will be 9 o'clock.

Roger, Al.

Okay, and Al, a word from the backroom says go at least two crater diameters away from - I guess, the crater you're just describing, when you get ready to take the double core.

Okay, we'll try to put it in the center of the three craters to get all three - well, to get whatever stratigraphy we have here. And the last fillets - picture, shadow 9 o'clock - was 18.

*** Al.

Okay. And since I've already taken a couple of pictures of the MET tracks, I won't do any more of that here, and probably won't again unless we see some difference in these tracks. They're - they're fairly what you might expect, because they're smooth; they're well packed and vary in depth only as a function of the - of the surface tension.

Fredo, I've left the LPM, returning to the MET. Had a little trouble with it that time. The bubble is tangent on the east side of - of the center ring.

Okay. On the east side. Let me know when you get there.

I'm at the MET.

Okay, I'll set up for the double core, here.
Okay, I'll be with you in a second. I have a pan to take, and I'll be right with you. Now be careful with the Velcro on the tongue. You can see it came off, except for one batch.

God damn. Why don't we just — ... it's about the right size.

It'll go in that outer pocket fine. I'll carry it — one of us can carry it when we're going between stops — —

It won't go down that way. Also, 16-millimeter MAG.

Okay.

Okay. Core tubes.

Okay, Fredo. You about ready?

Okay, 1 minute. You go ahead.

Okay, Y — This is high scale — Y is 1.0. I'm sorry. X is 1.0; Y is 8.1; Z is 6.6. Second set: X is 1.0; Y is 8.1; Z is 6.6. Third set: X is 1.0; Y, 8.1; Z is 6.65. Okay?

Roger, Ed. And I assume all of those were high scale again.

Beg your pardon? Those were all high scale. That's affirm.

Okay. We got them.

Okay. The bottom core tube will be number 2, no tab. Top core tube will be number 3, no tab.

Roger, Al. Top, number 3, no tab; bottom, number 2, no tab.

That is correct.

Okay. I need a pair of tongs —

And have you started reeling it up yet, Ed?
I'm starting that right now, Fred. The electronics are in the box, and I'm --

Yes. I just --

*** up the reel now.

Oh, no.

*** the matter?

This is a can of worms.

You're having some problem reeling it in there, Ed?

Yes. An awful lot of problem with it, Fred. The set in the cable is so much that if I ever let go of the handle, it winds down about three or four turns on me; and I have to - at least - then I have to take it back out. And the cable is all bunched up and curled out here. It's - I'm not sure I'm going to get wound or not.

Roger, Ed.

*** a different method of holding it.

Okay, Houston. A couple of quick stereo's in the locater of the core tube as it's about to be driven, and the locater of the LM is in the background.

*** Al.

Okay, Fredo. I got the LPM reel reeled in just enough to keep it off the ground. I'm trailing a can of spaghetti here.

Okay, Ed.

Al, you haven't taken a pan, have you?

No.

Okay. I'm starting with the pan.

Okay. Just in the way of bookkeeping, we need the double core and the pan and a sample.
Okay.

Okay, Houston. We got almost two complete tubes here, about one and seven-eighths tubes, I would say.

Roger, Al.

Okay, Houston. The pan is completed, and I took it from the rim of an old crater with fresh crater right in the bottom of it, and several small ones - small ones around it.

Yes. That's a pretty blocky one, that new one. I think if we take samples from right along that rim there, you'd probably get some of that from the bottom.

Yes. Okay.

*** better give them map coordinates ... --

Okay. We copied, Al and Ed.

Okay. And the core bit, just for the fun of it, is going in bag 2-November.

We need a DAC.

And, Al, they'd like a description of the surface where you drove the core tube.

Okay, Fred. Nothing, but it's the same textured pattern of which we spoke coming up in this traverse.

Uh oh.

What?

Where's our color chart?

Here you go. Did you read the core tip ***

2-November, Fred?
Roger, Al. We've got that, and for your information, we're about 5 minutes behind in the total time line, for departing A.

Okay. Continuing - our description of the surface, it appears to be a scattered population of very small blocks, some of which Ed is going to photograph here, and his documented sample. I believe they came from the crater to the north of the sampling sites. Other than that, the - that little core-sample site is not unique to the traverse, so far. The first core went in fairly easily. I had some *** difficulty with the last core.

Roger, Al.

Okay. ***

Get that by yourself?

Yes.

And, Houston, the rock I'm sampling is a - seems to be a fairly typical one of this little crater - multiple crater that we're working around, right now, near A; and it's going into the bag 3-November.

Roger, Ed. Copy 3-November.

Oops. It's breaking apart on me as I pick it up. I'll try to get most of the pieces.

*** Ed. And *** we need to move on here to B; and before we depart A, we're going to need an EMU check.

Okay. This is Al's EMU reading 3.75; oxygen is reading 71; I have no flags; I'm on MIN cooling; and I'm comfortable.

Al.

Yes.

Can you hand me another baggy?

Okay.
Houston, I can't get all of this sample in 3-N. Consequently, it will go into 3-N and the next one. It looked like it was fractured; and when I picked it up, it fractured into about four pieces.

Okay.

Roger, Ed.

Okay. Now head on up the hill to B.

Okay.

Okay. And we still need an EMU check from you, Ed.

Okay, Fredo. Give it to you in a minute.

Can you catch up with me all right?

Yes, I'll catch up. Go ahead.

Okay. Al is heading up with the MET. From A, we go down into a valley. We drop down a - a fairly consistent slope of approximately, oh, 8 to 10 degrees. The texture, here again, is pretty much the same on the surface. The basic regolith, of course is - of course, is the fine material which is now, at this particular Sun angle, kind of a grayish brown, with the light pebbles on the surface making the raindrop - the small pebbles on the surface making the raindrop pattern.

And, Houston, I'm - I'm treading along behind Al now, starting to catch up with him. It - it hasn't been described for you before; the MET tracks make a very smooth pattern in the - in the surface, reminiscent of - of driving a tractor through a plowed field. It smooths it out and makes a very smooth, distinct pattern, and probably, oh, a quarter of an inch deep, no more.

Roger, Ed.

And it leaves gaps every now and then as it bounces.
05 12 28 16  LMP  Yes. It's this - this big crater over here, isn't it?

05 12 28 18  CDR  It's way up the hill.

05 12 28 19  LMP  Pardon?

05 12 28 21  CDR  I think it's up the hill.

05 12 28 23  LMP  Oh, that's right. B is the crater we go - This is the crater we go by on the way to B.

05 12 28 28  CDR  Roger.

05 12 28 45  CDR  Okay, Houston. I'm looking for a contact somewhere in here, but it's not apparent at this point. Surface texture seems to be very much the same; *** the standpoint of *** bearing properties, it's still about the same softness; and it still has the same raindrop pattern.

05 12 29 11  CC  Roger, Al.

05 12 29 14  LMP  Oh, Fredo. You wanted a EMU check from me. I'm at 3.7, going 67 percent. I'm on MIN cooling; no flags.

05 12 29 37  CC  Roger, Ed.

05 12 29 38  LMP  And continuing the description a little bit, Houston. The - Trying - trying to think of an adequate description or comparison to something we've already seen, but I don't think there is one. Incidentally, I see a string of craters down to the south - a string of boulders to the south of us that may prove to be a ray pattern as we - from Cone. And I observe, as we get closer to the - to Cone, the number of large boulders is increasing. We're going to go past some here in a couple of minutes - near a - about a 20-foot-wide, fairly fresh crater. The boulders - a dozen of them or so - are 4 or 5 feet in diameter. Lot of filleting around them.

05 12 30 35  CC  Roger, Ed.

05 12 30 39  CDR  Okay. Let's see if we can find this -
This crater's the one, I think, Al. It's halfway between A and B, isn't it?

Yes, I think so. This little - -

Can you see the boulders off to the side there on the map?

No, they don't show very well. I think -

Ah! You should be able to spot that little chain of craters just to the south of it. On the map - if that - if that's where we think we are.

Ed, I don't see any craters right there.

Kind of small.

That will make us right here, huh?

Pardon?

There's no big one to go with it. A sharp one to go with it. This is that one right up there. How about that?

Yes. Let's take a look.

That's probably Weird right up there. We're probably about even with Weird right now, although we can't see it on the ridge.

That's Weird, that big one right over there, Al.

Yes, that's what I say. I think B is that deep crater right directly ahead of us, Ed.

No, I disagree. I think - See that crater right over there we came by? To the south, the big one?

Yes.

I think this is the crater that's at - that's at B. I think this boulder field, we can see it here, if you look.
This crater right here?

Yes. Yes, we have to be considerably past Weird.

Not even halfway to the - to the rim of Cone yet.

Yes, this place all looks alike out here.

Well, let's go on ahead --

And, Al and Ed. I don't - Yes. I don't think you have to worry too much about the exact position of site B. If you're - it appears you're getting close to the general area, that should be good enough on B.

Okay. I think we're very close to it. I think this crater we just went by is probably it, but it's very hard to tell, Fredo. I don't see anything else that might be it, unless it's the next crater up. Al, I've spotted it. That crater - next crater up is this one right here.

Which way are you pointing?

Pardon?

Where at?

Right behind you. That crater is that crater right up there. That crater is the crater over to the left of it.

Where do you think B is?

I think B's the one we just passed, back there where we were talking.

All right.

And here's the little - Aha, it is! Here's the little double crater right beside it. Look here. See, there's that crater; see, there's the little double crater; it's right there in front of you.

Okay, let's go sample B.
Let's sample B.

Okay --

Okay. And, Al and Ed, this is a grab sample at B, and we need the panorama. And while someone is doing that, we can get our site description.

I'll get a pan, then.

Okay. And while Al takes the pan, I'll go ahead and give you a site description. The area here is an area of considerably more boulders, a larger boulder field, more numerous boulders than we've seen in the past. We've just come into it as we -- as we approached B from A. Now, there are -- there were boulders to the north of us; we previously talked of boulders to the north; and, doggone it, they may turn out to be a ray pattern. It looks suspiciously like - like one. However, where we are now, we're about on the edge of a general boulder population lining the flank of Cone Crater. Now, they're not too numerous at this point. They're somewhat patchy. There's a lot of them buried, half buried, a few of the smaller ones sitting on the surface. There are -- these boulders are filleted, and we'll have to sample that filleting later. The surface texture -- the fine is very much -- appears very much the same as what we've been walking on all along. And about the only difference we can see is probably a larger number of smaller craters. I say probably; they're so numerous, unless you really make a population count, you can't tell. A large -- I'm guessing, a larger number of craters -- probably secondaries from Cone, perhaps -- and certainly a larger number of boulders lying around. Now, most of these boulders are rounded; there are a few angular ones; there are a few rocks with angularities -- but, by and large, you can see edges that have been chipped off, indicating the beginning of a smoothing process. And some of them are far beyond the beginning of smoothing. They're -- they're worn down pretty well. And most of the rough edges are where they have fractured and perhaps turned over. Most of them appear to be along fractures of where other rocks are sitting near them that might have once been a part of that boulder. Out.

CONFIDENTIAL
Roger, Ed. And has Al got the grab sample completed now?

He's - -

I'm grabbing it now.

-- grabbing it now.

Houston, give you a quick stereo on it.

Okay. And we need the fine count before departing B; and, right now, we're about 15 minutes behind in the time line.

Okay. Fredo, we expect we're going to fall behind you; there's no way we can help it. We'll pick it up later.

Well, we'll see about that.

Okay. Grab sample from the west rim of Bravo Crater, bag 5-November.

And, Fredo, to complete this description --

--- We are standing on a fairly high point - well, not really on a high point, about halfway up the slope. To our north and slightly to the west of us seems to be the low point in this area. It's surrounded by a rim that's reminiscent of a very, very old crater. Topography doesn't show up on the map, but indeed is there. About 500 yards to the north and - and west is the lowest point that I can see in this area. Okay, you ready to press on?

As soon as I get my handle screwed back on here.

Okay, the next stop is the top of Cone. Let's get everything secured for that trip.

Okay, Houston --

Okay. And we'd like the frame count before you depart.
Yes.
Yes.
Yes, you've got a frame count of 34 from Al.
And 29 from Ed.
Roger; 34 and 29.
Handle was loose.
Handle was loose for you?
Yes.
Okay. I've got the MET.
Okay. You want to go first and I'll follow.
Okay. To the top of Cone Crater.
Yes. And now, let's stick to the action here.
We're supposed to
*** we're starting the clock --
Okay.
We could go almost to the east here and then up --
Yes.
-- by Flank.
East, a little bit to the --
See? See, there's Flank up there.
Oh, yes. I can just barely see the rim of it or
the far side of it.
Right, so we probably ought to head directly for
Flank and on up from there.
Okay.
Okay, and -

Houston, as we go across here, this ground is - Al's probably previously described it, but it's very undulating. I would suspect that there is not 10 yards, at the most, between what were once old craters. They are, most of them, worn down, but the surface is continuously undulating. There's hardly a level spot anywhere.

Roger, Ed.

Lots of - As we come on up toward Cone, we're getting to seeing lots more buried rocks, bigger rocks.

We're keeping our eyes open for a contact here. But I guess the Sun angle makes it very difficult to see. However, I expect that by the time we get a little closer up to Flank - Let me pull it for a while.

I have to shift hands. I'm good.

Okay. By the time we get a little closer up to Flank, we might find some kind of a contact. The edge of Cone Crater to the north is very apparent, as we expected that it would be. It stretches off into the distance and meets with the far horizon.

Roger, Al.

Fredo, I'm trying to find something distinctive to say about some of these craters we're going by, and it's very hard to do so. They're all smooth-walled except the very freshest one; and we're coming by a very fresh one now, which is rubbly on the in - Hey! It may even - That has some pretty good chunks of rubble on the inside. This is about the freshest crater this size we've seen, Al.

That's correct. This is a very fresh crater. It's about ... it's about opposite to the crater at stop E. It's a crater about 20 meters in diameter and about 2 meters deep, and I'll get a quick rock from the side.
Very soft, too. Al just dropped down on a knee --
Roger, Al.

-- to pick up a rock, and he went -- went in 3 or 4 inches. Need some help, Al?

Yes, I think so. I can't get any.

Okay. Come on, give me your hand.

Wait a minute; I got it now. Okay.

Okay. Come on up.

Okay (grunt). Thank you.

You're on your feet.

Okay. That's just a quick hand sample from the side of that crater.

Do you think you're following us and know about where we are, Fredo?

That's going in bag --

Well, the board, I think, is --

Say, that's good. And --

-- looking about halfway between E and E.

Roger. And ...

Yes. And we're starting uphill now. Climb's fairly gentle at this point, but it's definitely uphill.

Okay, baby!

Okay, I got it.

Almost turned, didn't it?
<table>
<thead>
<tr>
<th>Time</th>
<th>User</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 12 43 43</td>
<td>CDR</td>
<td>Yes. Now that grab sample from the west rim of the crater, *** described as blocky, is in bag 6.</td>
</tr>
<tr>
<td>05 12 43 53</td>
<td>CC</td>
<td>Roger, Al. Bag 6.</td>
</tr>
<tr>
<td>05 12 44 02</td>
<td>CDR</td>
<td>Okay, the going is still very smooth as far as the - the area that we're able to pick out. Of course, we're tracing a kind of sinuous course here, staying out of the craters.</td>
</tr>
<tr>
<td>05 12 44 27</td>
<td>LMP</td>
<td>And, Fredo, we're - to help further locate us, if you can, we're going by two very - well, fairly fresh craters. I don't think quite as fresh as the one we were just talking about. The eastmost one is fresher than - The westmost one is the freshest. They're separated about 75 to 100 feet, and they're about 25 to 30 feet across and 5 or 6 feet deep - 5 feet deep, I guess. The westmost one has got small blocks in it. The eastmost one is very smooth (heavy breathing).</td>
</tr>
<tr>
<td>05 12 45 12</td>
<td>CC</td>
<td>Roger, Ed. And you described the blocks there a couple of times now. I think you used the term &quot;rubble.&quot; By that, I assume you implied they were just lying loose, just nothing really in place.</td>
</tr>
<tr>
<td>05 12 45 24</td>
<td>LMP</td>
<td>I'm not sure that's quite true, Fred. Some of it looked like stuff that belonged there, that had not fallen there.</td>
</tr>
<tr>
<td>05 12 45 33</td>
<td>CDR</td>
<td>There's a lot of glass in that rock, Ed.</td>
</tr>
<tr>
<td>05 12 45 34</td>
<td>LMP</td>
<td>Yes. Oh, there sure is. It looked like - Some of that so-called rubble looked like it had - might, be the - the residual of an impact just lying in the bottom. And, Houston, we're passing a rock much too big to pick up. There's a whale of a lot of glass in it.</td>
</tr>
<tr>
<td>05 12 45 53</td>
<td>CDR</td>
<td>It was splattered with glass.</td>
</tr>
<tr>
<td>05 12 45 54</td>
<td>LMP</td>
<td>Yes.</td>
</tr>
<tr>
<td>05 12 45 55</td>
<td>CC</td>
<td>Roger. About how big is it?</td>
</tr>
<tr>
<td>05 12 45 56</td>
<td>LMP</td>
<td>It's about a foot and a half, 2-footer - yes, about a foot and a half across.</td>
</tr>
</tbody>
</table>
That was a glass splatter, Fred.

Roger, Ed. And we copy the glass.

And, I'm going on MEDIUM cooling for a minute.

Okay. And, Al and Ed, why don't we take a little rest here for a minute; and we'd like another camera count, too.

Take a what?

We haven't taken any pictures since the last one, I don't think.

Okay, Ed.

Okay. We'll slow down the traverse here. Okay. Should be Flank right here, Ed.

Pardon?

Should be Flank right over here.

Just out of sight, you mean?

Right - Yes, right there.

Oh. Let's go over and see.

Okay, Al and Ed. I assume you're on the move now and heading toward Flank. Is that correct?

That's correct. Heading toward where we think Flank is. I'll pull for a while, Al.

That's okay. I got it for a while.

Why don't we pull up beside this big crater?

Okay.

Take a break, get the map, and see if we can find out exactly where we are. Press on from there. This one should be distinctive enough.
And ***

If you'll take the pan, Al, I'll grab the map and get over here and see if we can find the -

Pull it up on a little more level ground.

Okay. Give you a push.

Okay, there we are. Level?

That looks good.

Okay.

That old LM looks like it's got a flat over there, the way it's leaning.

Say that last again, Ed.

Just talking. Never mind.

Okay, Houston. The pan is complete on magazine - magazine Lima-Lima. Frame count is 57.

... You're breaking up, Fred.

... *** reading him? Ed, are you reading?

Yes, I read.

Read him?

I can't read Fred, no.

... Fredo, you're breaking up completely. ... statement.

Okay.
05 12 51 33 CDR  (sigh) Start on up toward the rim?
05 12 51 35 LMP  Yes. Just 1 second, though. I think I got it; just a minute.
05 12 51 40 CDR  Okay, I'll head on out.
05 12 51 49 LMP  Fredo, can you read? Now I'm getting the feedback from my own voice.
05 12 52 01 CDR  Okay. Ed, I'm coming through.
05 12 52 02 LMP  Okay. Do you want me to pull awhile, Al?
05 12 52 03 CDR  No, that's all right.
05 12 52 07 LMP  ...
05 12 52 13 LMP  I can't really spot this - this crater, but I think I know where we are. We're pretty close to where you said we were.
05 12 52 26 CDR  Houston, your transmissions are still unreadable. Is Flank over there?
05 12 52 31 CC  ...
05 12 52 33 LMP  I think it's dead ahead of you, Al. Oh, wait a minute. This is probably it, right here. Yes.
05 12 52 41 CDR  Am I right?
05 12 52 42 LMP  Yes. Let's just doublecheck and see.
05 12 52 47 CDR  It's got a - about a 4-meter-radius crater in the - in the south wall.
05 12 52 59 LMP  That has to be it.
05 12 53 03 CDR  Okay, Houston. We're going by Flank on the way up. We're passing to the north side of it.
05 12 53 13 CC  Roger ...
05 12 53 18 CDR  Fred, you're still unreadable.
05 12 53 25 LMP  Let me pull awhile, Al. You're having all the fun.

05 12 53 35 CDR  Well, we still have a little way to go.

05 12 53 36 LMP  Yes, we sure do. Putting the map away.

05 12 53 43 CDR  Huh?

05 12 53 44 LMP  I'm just putting the map away.

05 12 53 46 CDR  All righty.

05 12 54 07 LMP  Okay. Fredo, you back with us?

05 12 54 20 CC  Okay, I'll try again. How do you read, Ed?

05 12 54 23 LMP  Okay. That's much better. You got a background squeal.

05 12 54 30 CC  Okay. Evidently, that station switch gave us some problems. I've been copying ***

05 12 54 55 CC  Okay. We've been copying you most of the time, and I have you by a point now.

05 12 55 00 LMP  That's affirmative. And the grade is getting pretty steep.

05 12 55 18 LMP  And the soil here is a bit firmer, I think, than we've been on before. Except around what - the mounds in between craters where it's been thrown out. But, by and large, it seems to have a little firmer footing. We're not sinking in as deep.

05 12 55 47 CC  That should help you with the climb there.

05 12 55 53 LMP  Yes, it helps a little bit. Al's picked up the - Al's got the back of the MET now, and we're carrying it up. I think it seems easier.

05 12 56 02 CDR  Left, right, left, right.

05 12 56 09 CC  There's two guys here that figured you'd carry it up.
05 12 56 13 LMP  Say again?

05 12 56 17 CC   Said there's two guys sitting next to me here that kind of figured you'd end up carrying it up.

05 12 56 23 LMP  Well, it'll roll along here, except we can just move faster carrying it.

05 12 56 31 CDR  Okay. You want to rest here by this rock?

05 12 56 32 LMP  Okay.

05 12 56 36 CDR  *** I think it's worthwhile taking a picture of it with the closeup. Go ahead and keep going.

05 12 56 43 LMP  I'll pull on up. We probably ought to take a pan to locate everything here while you're taking a closeup (heavy breathing). Okay, you get that --

05 12 56 54 CC   Okay. I understand, Al. You're shooting a closeup shot of a big boulder.

05 12 57 03 CC   About what's the size of this one, Al?

05 12 57 07 CDR  Okay. The shot's been taken on the closeup, counter number 317. Sun angle was 8 o'clock. The - this particular one is only about 12 feet long by about 4 feet wide. It's about one-third buried. It's old, very weathered. There are some evidences of some crystal shining through some of the fractures.

05 12 57 37 LMP  And I'm taking a Hasselblad of the rock and will take a pan now - at - from this location. Help document our course going to the top of Cone Crater.

05 12 57 52 CC   Roger. Copy.

05 12 58 51 LMP  And I can look right across into the breach in the north rim of Old Nameless. We're about even with it, now. And my frame --

05 12 59 08 CC   Okay, and copied, Ed. And was there any noticeable dust on the large boulder?

05 12 59 17 CDR  Not where I took the picture, but some fillets around the bottom.

CONFIDENTIAL
Okay, copy and out.

Okay. And 44, Fred, was my frame count. I believe that was - If I remember it.

Roger, Ed.

Now, I'm going to move on out. Al's ahead of me here.

Okay. We're starting up the last flank of the crater now, Houston. The slope is probably about - oh, 18 percent. The surface texture is still pretty much the same, as far as the raindrop pattern is concerned. But we seem to find an increasing population of small rocks.

Small rocks and smaller --

Roger, Al.

-- smaller, fresher craters, as well. Well - Well, wait a minute; maybe I'm being deceived. With this slope, the Sun angle is entirely different than it is on the flat land. The craters look sharper in these shadows (heavy breathing).

Okay. Let's make an EMU stop.

Okay. Let me pull awhile.

I'd like to stop and rest here for a minute.

Okay.

Boy, I tell you, we're really going to get a panorama. We've got a tremendous one here, Houston, already. And we're not quite to the rim. Head towards out [sic] Old Nameless over there, right along our track - or just south of our track, I should say. We made the right approach; we came up through the valley and over the range and down into the bowl. Couldn't have planned it better.

I thought we were in a low spot with the IM, but it turns out we're really not in the lowest spot around, I don't think.
Well, I don't know. I tell you, it's probably the lowest spot right -

Oh, right in that particular local area.

Right in that area, yes.

But that's the low spot over to the right that I was talking about. And there's a low spot --

Well, there's a crater over there. It's true, yes.

Yes. Yes. Doggone it, you can sure be deceived by slopes here. The sun angle is very deceiving.

Yes.

Okay, let me pull awhile. You ready to go?

Yes. All set.

Go back to MIN cool, MINIMUM cool first.

I guess right straight up is the best way to go.

Beg your pardon?

Right straight up is the best way to go.

Yes, I think so.

Stay away from the rocks.

Okay. Get a little momentum going.

Okay, Houston. We're proceeding onward now.

Roger, Al.

And the boulder fields that Al pointed out - the rocks and boulders are getting more numerous toward the top here. However, it's nothing like the rubble and the large boulders that we saw at the Nevada test site. Now, this is surprising to me. I expected it to be more like that. But it is not, at least, not where we're looking now (heavy breathing).
Well, we haven't reached the rim, yet.

Oh boy, we got fooled on that one. I'm not sure that was Flank we were in a minute ago, either (heavy breathing). Wait a minute. Yes, it is. The rim's right here. That's the - that's the east - little shoulder running down from the Cone. That's Flank over there (heavy breathing). We're going to hit it on the south side. We'll have to move on around it. This looks like easy going right here. See, there's the boulder field that shows in the photograph - right up ahead of us?

There's a crater up there, Ed.

Yes. Pardon?

Crater up there.

Okay, Al and Ed. They'd like you to take another stop here.

Okay. We're really going up a pretty steep slope here.

Okay. We kind of figured that from listening to you.

Okay. Well, now, that's apparently the rim of Cone over there. And we're about - almost 2 hours now. Is that right, Fred?

Okay. We're showing 1:57 and a half now, Al.

Okay. That's at least 30 minutes up there.

Yes.

And - I would say we'd probably do better to go up to those boulders there, document that, use that as the turnaround point.

Yes. It's going to take longer than we expected. Our positions are all in doubt now, Fredo. What we were looking at was a flank, but it wasn't really - the top of it wasn't the rim of Cone. We've got a ways to go, yet.
Well, perhaps you can think --

Okay, Ed. And --

-- perhaps you can think with us, if you want. I'd say that the rim is at least 30 minutes away. We're approaching the edge of the boulder field here on the south flank.

Let's look at that map.

And what I'm proposing is perhaps we use that as the turnaround point. It seems to me that we spend an awful lot of time on traverse if we don't, and we don't get very many samples.

Roger, Al. And, just a couple of questions they have up now. They'd like your note, if you do see any dust, particularly on the top surfaces of boulders in the - in the area. And, any comparisons between the boulders you see distributed around. Are they all the same or do some types appear different?

*** We're not really in that boulder territory, yet.

I think, Fredo, if you'll keep those questions in mind, the best thing for us to do is to get up here and document - and sample - what I feel is pretty sure is Cone ejecta. And then, when we head down-Sun, we'll be able to see these subtle variations and rock types a lot better than we are right now.

Roger, Al.

Well, let's head for these two babies up here.

Hey, Al?

Yes.

I'd -- *** keep going around this crater, but - except you're right here.

Well, maybe. I thought we'd get those boulders up there, Ed. They --
05 13 09 01 LMP  Yes.
05 13 09 02 CDR  -- undoubtedly came from --
05 13 09 03 LMP  Yes. Let's head right for that boulder field at the top. I think we'll be where we want to be.
05 13 09 07 CDR  Right here.
05 13 09 08 LMP  Pardon?
05 13 09 09 CDR  Right here.
05 13 09 10 LMP  Yes, right - clear on up at the top, you mean.
05 13 09 11 CDR  No.
05 13 09 12 LMP  Huh?
05 13 09 13 CDR  I don't think we'll have time to go up there.
05 13 09 14 LMP  Oh, let's give it a whirl. Gee whiz. We can't stop without looking into Cone Crater.
05 13 09 18 CDR  Yes.
05 13 09 19 LMP  *** everything if we don't get there.
05 13 09 26 CDR  I think we'll waste an awful lot of time traveling and not much documenting.
05 13 09 31 LMP  Well, the information we're going to find, I think, is going to be right on top.
05 13 09 37 CC  We establish -
05 13 09 41 CDR  Okay, Ed. Look at this - you're going through - just kicked up a layer of some very light gray fine underneath the -
05 13 09 49 LMP  Yes. As you look back along your path, there's quite a bit of it.
05 13 09 53 CDR  Yes, this crater -
05 13 10 08 LMP  Fredo, how far behind time line are we?
Okay. The best I can tell right now - about 25 minutes down, now.

Okay.

We'll be an hour down by the time we get to the top of that thing. You got six samples.

Well, I think we're going to find what we're looking for up there.

Okay, Al and Ed. In view of your assay of the - where your location is and how long it's going to take to get to Cone, the word from the backroom is they'd like you to consider where you are the edge of Cone Crater.

Think you're finks.

That decision, I guess, was based on Al's estimate of another, at least, 30 minutes; and, of course, we - we cannot see that from here. It's kind of your judgment on that.

Well, we're three-quarters there.

Why don't we lose our bet, Al, and leave the MET and get on up there? We could make it a lot faster without it.

No. I think what we're looking at right here in this boulder field, Ed, is the stuff that's ejected from Cone.

But not the lowermost part, which is what we're interested in.

Okay. We'll press on a little farther, Houston. And keep your eye on the time.

Okay. And, as of right now, we have a 30-minute extension.

And Al, did you copy 30-minute extension?

We got it.
Yes. That's affirmative, Fred. Thank you.

Okay. Stop at this little rise here and take a panorama.

Okay.

Okay, Al's going to MEDIUM flow.

Okay, I'll take a pan from here.

Roger, Ed.

Well, I'll tell you, it's a fantastic view from here, as this pan will show.

We're approaching the edge of the rugged boulder field to the west rim. It appears as though the best for us to do will be go to the west rim and document from there, even though the Sun angle may not be quite as good. Well, we're pressing on in that direction. Al's back to MIN flow.

Roger, Al. You're moving to the west rim.

Al's back to MIN flow, and we're moving again.

And, Al and Ed, Deke says he'll cover the bet if you'll drop the MET.

It's not that hard with the MET. We need those tools.

No, the MET's not slowing us down, Houston. It's just a question of time. We'll get there.

Roger, Al.

Give you a hand, Al.

It's all right.

You caught a boulder with your wheel as you went around that corner (heavy breathing).

Al?
05 13 17 01  CDR  Yes.
05 13 17 02  LMP  Head left. It's right up there.
05 13 17 05  CDR  Yes. I'm going there.
05 13 17 55  LMP  You need a little more lift. Go right up through there. I'll give you a hand.
05 13 18 13  CDR  Okay. We're now right in the middle of the boulder field on the west rim. We haven't quite reached the rim yet.
05 13 18 49  CDR  Okay. Want to rest here a minute?
05 13 18 50  LMP  Yes. Let's take a look at the map. I think we're closer than that (heavy breathing).
05 13 19 07  CDR  Okay, I'll just go ahead slowly with this.
05 13 19 22  CDR  Okay. Find the crater?
05 13 19 27  LMP  Yes. The rim's right up here.
05 13 19 38  LMP  Let's see if we can spot this one, Al --
05 13 19 40  CDR  Okay.
05 13 19 41  LMP  -- on the map.
05 13 19 45  CC  Okay. And, Al, it looks like you'd be a little more comfortable there if you're on INTERMEDIATE.
05 13 19 54  CDR  Yes. Okay. We're resting now.
05 13 19 57  LMP  Look. Let me show you something.
05 13 20 00  CDR  Okay.
05 13 20 03  LMP  Here's that crater. We're down here. We got to go there.
05 13 20 09  CDR  What crater?
05 13 20 11  LMP  That crater right there is that one right there.
05 13 20 16  CDR  Okay. Want to pull for a while?
05 13 20 26 LMP Yes.

05 13 20 29 CDR Okay. We're about the maximum elevation now, Houston. It's leveled out a little bit. And it looks like we'll be approaching the rim here very shortly.

05 13 20 46 CC Roger, Al. And you can leave the dial in INTERMEDIATE. We're fat on the - for the feedwater.

05 13 20 54 CDR Okay. Thank you.

05 13 20 59 LMP Let me set mine. If we're in that good a shape, let me set mine, Houston, if I'm okay, too.

05 13 21 07 CC That's affirm, Ed. I guess the low item is the batteries.

05 13 21 13 LMP Okay.

05 13 21 25 LMP Oop! It's going over. No, got it.

05 13 21 41 LMP Fantastic stabilization, Al; it's going to turn over.

05 13 21 48 CDR Okay. We better reconnoiter here. I don't see the crater yet.

05 13 21 55 LMP I agree. *** rock under my wheels.

05 13 22 26 CDR See this boulder pattern and all that we're in here, right now? This boulder field and all?

05 13 22 31 LMP I thought it was on the south rim.

05 13 22 37 CC And, Al and Ed, do you have the rim in sight at this time?

05 13 22 43 LMP Oh, yes.

05 13 22 44 CDR That's affirmative. It's down in the valley.

05 13 22 51 CC I'm sorry. You misunderstood the question. I meant the rim of Cone Crater.

05 13 22 56 CDR Oh, the rim. This is negative. We don't - haven't found that yet.
05 13 23 08 LMP
This big boulder right here, Al, which stands out bigger than anything else - ought to be - ought to be able to see it.

05 13 23 15 CDR
Well, I don't know but what the rim is still - way up there from the looks of things.

05 13 23 23 CC
And, Ed and Al, we've already eaten in our 30-minute extension, and we're past that now. I think we'd better proceed with the sampling and continue with the EVA.

05 13 23 35 LMP
Okay, Fredo.

05 13 23 38 CDR
Okay. We'll observe with a pan from here. I'll take that.

05 13 23 45 LMP
All right, I'll start sampling.

05 13 24 24 CDR
Okay, Houston. We are in the middle of a fairly large boulder field. It covers perhaps as much as a square mile. And - as the pan will show, I don't believe we've quite reached the rim yet, although we can't be too far away. And I think, certainly, we'll find that these samples are pretty far down in Cone Crater.

05 13 25 00 CC
Roger, Al.

05 13 25 11 LMP
Okay. Come on.

05 13 25 33 CDR
Okay, you about to start taking documented samples?

05 13 25 36 LMP
Right here.

05 13 25 38 CDR
All righty. I would say, Houston, that most of these boulders are the same brownish gray that we've found. But we see one that is definitely almost white in color. A very definite difference in color, which we'll document. We noticed that beneath this dark brown regolith, there is a very light brown layer. And I think we'll get a - a core tube right here to show that. As a matter of fact, I think I'll do that right now.

05 13 26 14 CC
Roger, Al. And for your information, we won't be doing the polarimetric experiment.
I understand, you will not be.

That's affirm. You can delete that one.

Okay, Al's going back to MIN cool.

Roger, Al. And, Ed, I need an opinion. Do you think you'd be able to deploy and take the second and last LPM reading at this location?

Yes, we can take it at this location.

Okay. What I have on the board here to perform at - I guess we'll call it C-prime - is a sample, and I guess you already got a pan - I thought somebody did - and the LPM then.

Okay.

Okay. Let me suggest that we take one of these football-sized rocks from here, too, Fredo.

Yes.

Roger, Al. Very good.

This area that we're in right now is - we're sampling in - is a pretty darn rugged boulder-strewn area. One of the smaller rocks I've sampled is going into 7-N.

And, Al and Ed. When you can work it in, we'd like and EMU check.

Okay. Al, 3.75 and reading 52 on the oxygen; and I'm in MEDIUM flow and I'm comfortable; no flags.

Okay. I'm reading 3.75; I'm 48 on oxygen; I'm now at MIN flow, having just shifted; and I'm comfortable.

Okay. LPM deploy.

Roger.

Okay. The core-tube sample turned out to only be about three-quarters of a tube. The area is apparently very rocky, but I did get down into the
second layer, the underlying layer, of the regolith, which was white as opposed to being dark brown.

Roger, Al. Understand you got down to another layer that looked white below the dark brown.

On second thought, forget that core tube. It's too granular, and most of the material came out of the tube. I'll just scoop a couple of samples, and bag it, of the two top layers.

Roger, Al.

Hey, Fredo; I'm having a hard time leveling the -

Okay --

Okay, there it is.

And, Al. About what sample bag number are you up to now?

7-N was the last one I put in.

Okay, Fredo, we're up on 12 here. I don't know whether that's consecutive or not, apparently not.

Okay, Fredo, I'm - I'm back at the MET, having left the LPM; took my time.

The LPM is aligned about 3 degrees --

Roger, Ed.

-- 3 degrees to the north of the east-west line.

Okay. 3 degrees to north.

And it is level; the bubble's just about in the center.

What's the size of the largest block y'all have passed, Ed?

That we've gone past? Oh -

Would you hand me the shovel, please, Ed?
Roger.

Hey, Fred, are you ready to read the LPM?

Fredo. Houston, you still with us?

Affirm, Ed.

Okay, can I read the LPM?

All right. You can go ahead with the reading, Ed.

Okay. I'm on --

All right. Go ahead, Ed.

-- low scale, 4.9 on X; Y, 4.6; Z, 6.5; X, 4.9; Y, 4.6; Z, 7.0; X, 4.9; Y, 4.5; Z, 7.5. And it's still going up in Z. Better give you one more set. X is 4.6, Y is 4.4, Z is 8.0; and it seems steady at that level.

Roger, Ed, copied all four sets. And all were taken on low settings, and you can discard the instrument at this point.

Okay. It is done.

And, Al, did you say you had taken a sample of the white boulder, or was that too large to sample?

No. Right now, I'm sampling a layer that is sort of a light gray just under the regolith. That went in bag number 9, and bag number 10 was a sample of some of the surface rocks that were - that were right around that area. It looks like kind of a secondary impact that had disrupted the surface regolith and gone on down into the gray area. Okay.

Roger, Al.

You want to --

Oh, we'll make - make a grab sample here, as well as documenting. Get one that'll...

Okay. And, Ed, is the LPM still in your immediate area, then?
05 13 36 50 LMP Yes.
05 13 36 53 CC Okay. They wanted a temperature reading off of it.
05 13 37 00 CDR Okay, he'll get it for you in a minute.
05 13 37 02 LMP Here, I'll get it - minute. Okay.
05 13 37 22 CDR Do you want the gnomon?
05 13 37 23 CC Okay. And, Al, did - did you mention either seeing a white boulder or a brown - a brownish-gray boulder earlier?
05 13 37 37 CDR I mentioned there's a boulder definitely whish in color, Fred. And we'll be over there in a minute. Not in our immediate vicinity. But it definitely looks well worthwhile sampling.
05 13 37 49 LMP All right, the LPM -
05 13 37 50 CC That's affirm. They concur here and we'd like you to sample from the white boulder. Go ahead, Ei.
05 13 37 56 LMP 125 on the LPM.
05 13 38 01 CC Roger, copy.
05 13 38 08 LMP Okay. Where is it you're headed for, Al?
05 13 38 11 CDR Well, - -
05 13 38 12 LMP I'll get the bag.
05 13 38 13 CDR -- something we ought to do, if we want to drag the MET with us, is - See that white boulder down there?
05 13 38 21 LMP Yes, I saw it. And there's a - that's a - bummer. Yes.
05 13 38 24 CDR We can sample both - both types of boulders right down in that area; so, let's go on down there.
05 13 38 29 LMP All right.
And can you give us a feel, Houston, about when you'd like us to leave the area?

Okay. Estimated time of departure is in about 8 minutes - 7 and a half minutes.

Okay.

Okay. You want the hammer? I'll grab it.

Okay. I guess we just run down there this way, huh?

Yes. Okay. I see - One of these boulders, Fredo, is broken open. They're really brown boulders on the outside, and the interface that's broken is white, and then another one that most of it is white. They are right in the same area.

Yes, I believe that's probably a - -

Okay, Ed. I assume you're going to sample some of those.

That's where we're headed right now. It's about 50 yards away.

Why don't you go on down and start, and let me bring the MET down.

All right. Yes. It's further than it looks.

That's the order of the day.

Okay, Fredo. I'm right in the midst of a whole pile of very large boulders here. It's - See what I can do to grab a meaningful sample.

Roger, Ed.

First of all, let me start my photographing. This whole area.

They're all so darn big that there's hardly anything that I can find. Let me see if I can chip one.

Okay, Fredo - -
Okay, Ed and Al, to get - to get us back on the old time line here, when you depart C here, we'd like to proceed directly to F, Weird. And we'll pick back up from that point. En route, you can make grab samples as you see fit.

Okay. And Fredo, I've just --

And another note I'll remind you of later on. Go ahead. I'm sorry.

I've chipped off one of the white rocks. I put it in bag 13-N. I'll photograph it. There don't seem to be any samples of the white rocks lying around that are small enough for me to sample and be sure that's what I'm looking for.

Roger, Ed. 13-N.

Now, just going around picking up hand-size grab samples from the immediate vicinity of where Ed is - is operating. I have a couple that are going in bag 16.

Roger, Al.

*** help with that one?

That's all right; I can do it.

There's a football-size rock, Houston, coming out of this area, which will not be bagged. It is - appears to be the prevalent rock of the boulders of the area.

That's better.

That can go in one of the Z-bags.

Roger, Al; we copy.

Okay. You got a sample of that white rock?

Yes, I got one batch of particles.

Okay. Put it right in here.
I don't think it'll go.

Yes. Core tube's out of the way. It'll go.

Okay. We'll just try it back that way.

Okay. Let's get another one.

Okay, Al and Ed. We have about 1 more minute here at C.

Okay. We're moving on down the hill, now. Okay. Can you see Weird from here?

No.

Kind of hard to find.

I can't even see Triplet from here (laughter).

Okay, let - let's --

Wait a minute, Al. Let me take one quick look at the map before we move. Waste a minute looking.

Why don't you take the map, and I'll just head down to the general area of the LM, and you'll probably get enough elevation view from down there so we can see Weird.

Okay. We're leaving C now, Houston.

Hey, Al?

Yes?

Do you see North Triplet?

Roger, Al. And to rephrase the question earlier, on the way back down, you might integrate any distinction in the lithology on the way back with a better Sun angle, and you're free to take grab samples - samples en route to Weird.
05 13 46 34 LMP  Al, I think that's weird to the north - I mean just to the left of North Triplet. And North Triplet appears to me to be right behind the LM.

05 13 46 46 CDR  Yes.

05 13 46 47 LMP  You agree?

05 13 46 49 CDR  It's between - it's halfway between those two large boulders and one way down.

05 13 46 57 LMP  Yes, I think that's right. Uh-huh, that's the one.

05 13 47 00 CDR  Okay.

05 13 47 09 CDF  Okay. These rocks - these boulders in - in this field here appear to be very weathered, obviously not by atmosphere but - but eroded by some process, because they all show cracks. They show evidences of being broken up either by impact or subsequently. And it looks to me as though these rocks are really pretty old.

05 13 47 47 CC  Roger, Al. And do you have anything left on the 16-millimeter or has it been running on the MET?

05 13 47 55 CDF  No, it hasn't. We might turn it on now - follow the progress.

05 13 48 00 CC  Roger, Al.

05 13 48 08 CDR  It running now?

05 13 48 13 LMP  Have you checked the setting on it?

05 13 48 16 CDR  Guess I better.

05 13 48 21 LMP  ...

05 13 48 22 CC  And, Al, without taking any extra time, if you - -

05 13 48 24 LMP  Come across.

05 13 48 25 CC  - - come across any boulders large enough, we might fill the comm check on the way down, if you haven't already done that on the way up.
I don't think we're going to find any along our path big enough, Fredo. The very largest ones are off to the right - south of us a bit - and up the hill a bit more.

Let's go on - Did you want anything back there?

No.

Oh, okay.

You want me to hold you back?

No, that's all right.

Watch out. Bet you're going to go over here a minute.

I can't catch you. Okay.

And here again, Houston, the texture here appears to be - the regolith appears to be a lot of - of pebbles, approximately a quarter of an inch on down to go along with the fines. And the same textured pattern we spoke of before and photographed is also here.

Roger, Al.

Okay. Why don't we stop here to see if we're really going to Weird?

Yes. Man, the LM doesn't seem like it's getting much closer.

Is that Weird right down there, you think?

Hun? No, Weird is - Weird is almost due east of the LM. That's - Oh, there it is. Look, see --

And, Al and Ed --

Switch ... -- We'd like an EMJ check.
Okay; this is Al. 3.75 and 45 percent; and on MIN - MEDIUM flow; and I'm comfortable.

Okay, this is Ed. I'm on 3.75; MIN flow. I'm 40 percent and very comfortable. And there's Weird, Al. You can see the triple crater in it. It's the --

Okay.

-- the white spot?

Roger.

Got it?

Yes. With the boulder in the near foreground.

Yes.

Okay. We're now out of the boulder field, Houston, and proceeding on down to Flank.

Roger, Al.

And, I believe - just get a shot - let's get a sample of that baby right there. Let's grab something from that one.

All right.

He's going to get a quick grab here of a rock, and I'll - I'll photograph it because it's got some tremendous fillets in it.

Okay.

Don't hit the fillets until I photograph it.

All right.

It's not there. Why don't you let me get a quick shot there. Okay, a quick pan across there. Okay. That looks like - Yes, we ought to get a piece of that baby.
<table>
<thead>
<tr>
<th>Time</th>
<th>Entity</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 13 52 33</td>
<td>LMP</td>
<td>No, man; that's hard, hard, hard! Look at that melt in it.</td>
</tr>
<tr>
<td>05 13 52 42</td>
<td>CDR</td>
<td>Yes. Okay, here's a piece of it. All right?</td>
</tr>
<tr>
<td>05 13 52 55</td>
<td>LMP</td>
<td>Come way on back here.</td>
</tr>
<tr>
<td>05 13 52 57</td>
<td>CDR</td>
<td>Crystals here; don't lose it. Okay, that was about - it's about where we - No, I guess not.</td>
</tr>
<tr>
<td>05 13 53 13</td>
<td>LMP</td>
<td>Hold it a minute. Hold it! Let me get a bag.</td>
</tr>
<tr>
<td>05 13 53 15</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 13 53 16</td>
<td>LMP</td>
<td>This darn bag dispenser is not doing what it's supposed to do.</td>
</tr>
<tr>
<td>05 13 53 22</td>
<td>CDR</td>
<td>Go ahead and take two. Small.</td>
</tr>
<tr>
<td>05 13 53 26</td>
<td>LMP</td>
<td>Houston, the rock we're taking is in 14-N. Grab sample from a filleted rock.</td>
</tr>
<tr>
<td>05 13 53 33</td>
<td>CC</td>
<td>Roger, Ed. 14-N.</td>
</tr>
<tr>
<td>05 13 53 34</td>
<td>LMP</td>
<td>Large filleted rock that - Al photographed. Okay, let's go on. Do you want me to pull awhile?</td>
</tr>
<tr>
<td>05 13 53 40</td>
<td>CDR</td>
<td>No, just watch everything. We don't want anything to drop off.</td>
</tr>
<tr>
<td>05 13 53 45</td>
<td>LMP</td>
<td>You want me to hold back awhile and -</td>
</tr>
<tr>
<td>05 13 53 47</td>
<td>CDR</td>
<td>No, no, no. I'd let it - just let it run. We don't want to lose anything.</td>
</tr>
<tr>
<td>05 13 53 53</td>
<td>LMP</td>
<td>No. It's holding in very well. *** doesn't turn over. A little higher c.g. now than we had before with that big rock in there.</td>
</tr>
<tr>
<td>05 13 54 16</td>
<td>CDR</td>
<td>Fredo, could you give us an idea of about what time we should arrive at Weird? How much more time?</td>
</tr>
<tr>
<td>05 13 54 24</td>
<td>CC</td>
<td>Roger. Stand by 1.</td>
</tr>
<tr>
<td>05 13 54 51</td>
<td>LMP</td>
<td>That 16-millimeter's bouncing all over every place.</td>
</tr>
<tr>
<td>05 13 54 54</td>
<td>CDR</td>
<td>Ought to be a good - good -</td>
</tr>
</tbody>
</table>
05 13 54 56 LMP  It's taken photos from every view.
05 13 55 15 CDR  Okay. I hate to make a grab here that's not from
this crater. Looks like that cut fairly deep, though.
05 13 55 26 LMP  Yes. Let's - Hey, here's a whole batch of them
right down here, Al. Let's grab those.
05 13 55 32 CDR  Which way, left or right?
05 13 55 34 LMP  Off to the left and ahead - around that little
crater. They're all from this same area.
05 13 55 40 CDR  Houston. Unable to see any stratigraphy in any of
these craters. The slumping has been such that it's
pretty much destroyed --
05 13 55 54 LMP  I'll grab this one right here.
05 13 55 56 CDR  -- any evidence of stratigraphy.
05 13 56 00 CC  Roger, Al. And I assume, positionwise, you're past
Flank, now. Is that correct? Or at least, the
D position of Flank?
05 13 56 13 CDR  No, we're not, Fredo. We're - no, we're not at
Flank - at Flank, yet. I'd say we're probably
15 minutes away from Weird. Did you get it on
board?
05 13 56 25 LMF  As a matter of fact, I think this is - this is
Flank right here.
05 13 56 29 CDR  Get it on board?
05 13 56 30 LMF  Yes, I've got the rock on board.
05 13 56 31 CDR  Okay, let's press.
05 13 56 35 CC  Roger. And one other question that's up there is
to check for the stratigraphy reported earlier of
the light gray-white layer below the top, if you
see that exposed anywhere.
05 13 56 48 CDR  Okay. Now, we did not see that until we started
approaching the edge of the boulder field. The -
There's no evidence of that at all that we noticed.
Not down this far. One thing I did notice - further outside of where we saw the white underneath - but it looked like an impact had either been of the white rock or it was a splatter of white. And it was just outside where Al was reporting that the underlying layer was white. As a matter of fact - No, that just - The Sun angle was causing it. Right now, some of the spray that we're kicking up looks white underneath, but I'm convinced it's just the angle. I looked back the other way, and it - it's not substantiated.

Roger, Ed.

Hold it.

That's what I'm trying to do.

Okay, we're moving along pretty well, Fred, at this point. And I'd say we're still probably about 10 minutes away from Weird.

Very good, Al. It sounds like you're making a little better time going down than up.

Yes, the slope's a different way, Fredo. In this case, the MET helps.

Okay, don't let me lose that baby. That's it right there with the three --

Yes.

-- with the three rocks beyond it.

Yes. We're getting down to the place where we won't see it.

This is probably Flank right here, isn't it?

I'm not going to say until I get down and look at the exact pattern. It probably is, Al. But if this is really Flank, we should have been at the top of Cone Crater where we were.

Yes, I know.
I think we've already passed Flank. Now, it's stopped. We'll have to wait on it.

Okay. It maybe - looks down here, Ed - that maybe what you're looking at there, if you've got another Flank-size crater, is the one by E.

No, this is a big crater. It - it's 40 - 50 meters across. It has a fairly sharp crater in the south edge of it, which is 20 - 30 meters across.

Okay, that looks like it may be the one by E.

Yes, I think that's it, Fredo. And it's - No, it's at least 50 or 60 feet deep.

Why don't we just grab a couple from right here?

Yes. Okay.

That baby came apart. Very soft.

Yes, it's falling apart as you pick it up. Very crumbly, isn't it?

Okay. You got a bag ready?

Yes.

Very, very soft rock - Remember that crater? - Plus another one very close to us with crystal in it. It's flashing. Now, going in the bag.

15-N.

Okay.

Okay, copied 15-N.

Okay to rush?

Not quite; let me get it in there.

Stay behind me; we don't want to lose anything, now.

Okay.
Okay, that's where we're going, right there.

Yes, going right for Weird. Head right for the big boulder. Then, Weird's right beyond it.

All right.

Easy.

Okay, keep going.

This is Ed. I'm going back to MEDIUM cooling.

Roger, Ed.

We - One of the problems of going downhill here is that you have defraction - essentially defraction, I guess, around your body; and it creates a halo effect in your shadow; and you just can't see a darn thing, right in front of you.

It's completely either blacked out or washed out right --

Copy, Ed.

We're going predominantly down-Sun, now.

Okay, Fred, we're still moving, and - looks about 3 minutes away now from Weird.

The crater we're going by now, we're just to the north of it, Fredo, is an old subdued crater.

If you want to run over behind that boulder over there, I'll try to talk to you.

You're the one that has to get behind it and try to talk to Houston.

Oh, that's right.

I'll pull the MET. Go ahead.
Okay. On second thought, maybe it's not big enough. I'll just --

No, don't think it is.

No, I guess not. Sure is a big old boulder. I'll take a picture of it, anyway.

Okay, and this - this big boulder, Al, is - you're just about at Weird now. Is that right?

Oh, probably a couple of hundred meters short of Weird.

This country is so rolling and undulating, Fred, with rises and dips everywhere, that you can be going by a fairly good-size crater and not even recognize it.

Roger.

Okay, back with you.

Okay, I think this is Weird right - to our right here - forward, Al. See that fresh one right there? I think that's the fresh one of the Weird pattern.

Well --

Okay, Al and Ed; on the Weird task, we'd like to pan and grab samples at Weird; and we'll pick up most of our tasks that we had bypassed at E - when we get to Triplet.

Okay.

Okay, I'll get the pan. I think A itself is right in here, isn't it?

Where are you?

Behind you, to your left. See right down there?

No, I didn't think so; I think this is it right here.
<table>
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<tr>
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<th>Text</th>
</tr>
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<tbody>
<tr>
<td>05 14 06 56</td>
<td>CDR</td>
<td>No, that's too small, I believe. Well, anyway, we're in the area, Houston.</td>
</tr>
<tr>
<td>05 14 07 03</td>
<td>LMP</td>
<td>Take us a minute to find it. I suppose you probably — Well, that's a pretty big one over here.</td>
</tr>
<tr>
<td>05 14 07 10</td>
<td>CC</td>
<td>Okay, Al, I think the — the pan will fill us in as to the exact position.</td>
</tr>
<tr>
<td>05 14 07 16</td>
<td>CDR</td>
<td>Okay, pan's underway, now.</td>
</tr>
<tr>
<td>05 14 07 46</td>
<td>CDR</td>
<td>Okay, pan's complete. Did you get a grab sample, Ed?</td>
</tr>
<tr>
<td>05 14 07 51</td>
<td>CC</td>
<td>Roger, Al.</td>
</tr>
<tr>
<td>05 14 07 54</td>
<td>LMP</td>
<td>*** grab some right up here, Al.</td>
</tr>
<tr>
<td>05 14 07 57</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 14 08 32</td>
<td>CC</td>
<td>And I guess this is going in bag 16. Is that right, Ed?</td>
</tr>
<tr>
<td>05 14 08 38</td>
<td>LMP</td>
<td>This is in bag 17, Fred. Sixteen got used — some time back.</td>
</tr>
<tr>
<td>05 14 08 46</td>
<td>CC</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 14 08 48</td>
<td>CDR</td>
<td>Okay; let's press on.</td>
</tr>
<tr>
<td>05 14 08 50</td>
<td>LMP</td>
<td>It's so darn big, it's hard to fold out.</td>
</tr>
<tr>
<td>05 14 08 53</td>
<td>CDR</td>
<td>We've got a pan and a grab sample. What else do we want from here, Houston?</td>
</tr>
<tr>
<td>05 14 08 58</td>
<td>CC</td>
<td>Okay, that's — that's it, Al. We'd like to proceed on to the North — —</td>
</tr>
<tr>
<td>05 14 09 02</td>
<td>CDR</td>
<td>Whup!</td>
</tr>
<tr>
<td>05 14 09 03</td>
<td>CC</td>
<td>— — Triplet, and — —</td>
</tr>
<tr>
<td>05 14 09 04</td>
<td>CDR</td>
<td>Wait a minute.</td>
</tr>
<tr>
<td>05 14 09 05</td>
<td>CC</td>
<td>— — I'll give you — the — tasks when we get there.</td>
</tr>
<tr>
<td>05 14 09 13</td>
<td>CDR</td>
<td>Okay, we'll try to get to North Triplet.</td>
</tr>
</tbody>
</table>
05 14 09 15 LMP You ran out from under me just as I was picking it up.

05 14 09 18 CDR Oh, I'm sorry.

05 14 09 26 LMP Okay.

05 14 09 34 CDR Okay.

05 14 09 36 LMP Oh, man.

05 14 10 03 LMP *** some blocks from the --

05 14 10 04 CC And, Al and Ed, for your stop for the E, we'd like that - take an estimated one-crater diameter short of the crater - North Crater.

05 14 10 22 LMP You want us to stop one-crater diameter short.

05 14 10 26 CC That's affirm; because some of the items coming up are the core and the trench.

05 14 10 30 LMP Okay.

05 14 10 31 CC Triple core.

05 14 10 32 LMP I think we're seeing the rim of the Triplet series right ahead of us, aren't we, Al?

05 14 10 48 CDR I would say so, yes. If we can say that's the rim of the North right there.

05 14 10 51 LMP Yes. It's got boulders on it, and that's the only thing big enough to have boulders. We're probably about one diameter out, right now.

05 14 11 00 CDR I'd say we are. Right here.

05 14 11 05 LMP The way we've been estimating distances today, that rim has to be at least 6 miles from here.

05 14 11 10 CDR Okay, Houston; we're about one diameter to the east of North Triplet.

05 14 11 16 LMP To the west of - yes, east of Triplet. Excuse me.

05 14 11 20 CDR Okay.
Okay, copied, and the number 1 item is the triple cores.

Okay.

Where's the third core tube?

Well, why don't you use clean ones?

I don't have clean ones.

Yes, you do. They're down in this pocket, right there.

This one?

Let me get my camera tightened up.

This one's been used.

No, no, no. In here, Ed.

Oh, okay.

The three tabs should be clean.

All right.

Okay, we'll pull it back together here.

Do you have an O to that -

Now, I'm clear to the bottom of that, I think.

Okay; we've got the camera back together. Okay, Fredo, for your info, the CDR's COMMANDER is reading 117.

Roger, Al; 117.

Okay, I'll get it.

Start with this one. We've only got two fresh ones in here. You've got four out that are used - or that look like they're used.

Okay, the three tabbed ones, we haven't used yet. Let me get them, Ed.
Okay. I'll take the tabbing off of this one.

Yes, I think that's the best way to go. Let's make - make them 1, 2, 3 for simplicity's sake.

I don't have a back from that one; where'd it go?

The bottom one will be number 1 tube with a tab, Fredo. Got 2 there?

Roger.

Number 3.

Okay. Hold on to that one. Okay? And the other one will be number 2 with a tab.

And the top one will be number 3 with a tab.

Roger, Al. And we're going to subtract off 15 minutes from that extension due to PLSS oxygen.

Okay. You still planning on --

So that gives us about --

Go ahead.

Okay. That gives us approximately 25 minutes at stop G, here.

Twenty-five minutes until what?

*** help you. Okay, I got this one. Go ahead; start your trench, if you like.

Okay. I'll dig the trench in the far wall of this crater here, Ed.

Right.

Fredo, I've tried to push in the core tubes - triple core tube - I get maybe a - oh, 3 to 4 inches of pushing in by hand. And it's just surface stuff; very soft - It will not support the weight of the core tube. Now, I've got it balanced, and I can take a picture of it, perhaps.
Okay. We're reading you, Ed.
Okay. We'll try to drive it.
And do I understand correctly, Ed? You're taking care of the triple core on your own there?
That's affirm. Al's digging - busy with his trench.
Okay; very good.
I'll go over and help him photograph it in - a while. And it - it's not going in easy, Fred.
Roger, Ed.
I'll try driving it a bit more, but I think I'm on solid rock; and I'm about one core tube down.
Roger, Ed. Solid rock, about one core tube down.
Yes.
Okay. The recommendation, Ed, is to pull it up and move - over a bit and try it again.
The way this one feels, it'll be the same thing.
Okay. Ed; and when you pull it out, they'd like to save the bottom core and replace it with another one there, when you try - before you try again.
Okay.
How's the trench going, Al? Are you getting - getting down there?
I've got a trench here. It's going fairly easily, but I need the extension angle - handle to get it deeper; so, I'll wait until Ed's through with that. I'm cutting into the rim of a crater which is approximately - oh, say, 6 meters in diameter, has a depth of about three-quarters of a meter. And we're back in about one diameter away from the North *** Triplet. The trench is going through at least three layers that I can see. The fine-grain surface, dark browns; then, a layer of what appears
to be quite a bit of glass; and then, a third layer of some very light material. And we should be able to sample all three of these.

Fredo, the core tube cap —

Roger, Al.

-- core tube cap from that sample is in 18-N.

Roger, Ed. Roger, Ed.

And a very interesting looking rock with really fine-grain crystals in it. It's a grab sample, Houston, from that same crater in which I'm digging. It's too large for a bag; it's dark brown except where it's fractured. It's fracture face is very light gray with very small crystals.

Roger, Al; and if you can get any with your samples down in the trench itself that have any ... rock fragments, you might include those as part of your sample.

Put it in the side bag. Put it in that side bag if you can; these are all - full - full back here.

Okay.

Let me help you. Okay, baby.

Are you about through with the extension handle, or are you going to go -

Go ahead and take it. I don't really need it to - to drive.

I'll go over and cut that baby, and we'll - over here. Okay, Houston; I know that - we did not mention this white layer - down in this area before - that was so obvious to us just below the surface up near the flank of Cone. But it appears as though it is - quite a bit - Well, it's relatively deep, as far as visual observation is concerned. And certainly not any would be kicked up by foot-prints, or by tracks, or the like. Appears to be some of that here in this trench.
Fredo, did you get my --

Roger, Al.

-- my report that the core tube cap - tip was in 18-N?

Roger, Ed. I got that; 18-N.

Okay, and I have taken the bottom core of that one, which was core 1 flagged; and it's now by itself - as a single core tube; I'm going to replace that with - number 1 unflagged, which is one Al started to use earlier but didn't get anywhere with it.

Okay. Number 1, unpegged, on the bottom.

You know what's happening in this trench; it's the - surface fines are so loose that they're just falling down, covering the layering that we want to get. I say, we're not going to get a classic vertical wall here, Houston, on this trench.

Yes.

And, Ed, are you having any better luck on the triple core this time?

I've got it in about half a tube. But I'm - getting ready to take a picture of it, so you can locate it; then, we'll go ahead and drive it the rest of the way in.

Roger, Ed.

Okay, Fredo. There's three frames here, probably 69, 70, 71, that are core tubes. The first one's the aborted one that I couldn't - couldn't get in. The second one - the second picture is the - this new attempt, and a 15-foot shot that I raised up and took a locater shot on the horizon on this one. I think it might go.

Very good, Ed.

Okay, I'm getting down low enough; I'm going to have to have an extension handle to finish driving it, I think.
Okay, I'll give it back to you. I'm really kind of through with this trench.

Roger, Al.

Yes.

Okay, Fred. Bag 19 for the sample of the surface fine - that is, from the - the surface layer of the trench.

Roger, Al. Bag 19 is the sample of the surface fines.

I am unable to take from the walls of the trench the type of material - blocky type of material that I could see while I was digging; so, I'll just get a shovelful of that, and we'll mix the surface with the second layer.

Roger, Al. How deep did you finally end up getting down?

Well, the trench is about a -- it was covering all the evidence of stratigraphy.

Roger, Al.

And, Houston, I'm over 40 feet - 50 feet from where Al is; and, on the east side of these craters, I have the triple core in about a tube and a quarter; and it's tightening up again. I just don't think it's going to go the rest of the way. I'm maybe driving it a millimeter a stroke.

Okay, Ed.

I'll hit it a few more licks, and we'll see if we can break through or move it a little more. No, that's as far as it is going, Houston; one and a quarter.

Okay, Ed. We'll just take your judgment on that; when you don't think you're getting it in any further, you can stop there.
Okay. I think I could probably beat it for the next 10 minutes, Fred, and not get another inch out of it.

Well, I don't think you need the exercise; you may as well extract it now.

I agree. I'll take a picture of it, a final picture of it, to show you how far we got with it.

Okay, Houston; this is Al. And bag 21 is kind of a collection of the - the combination of the top two layers. Second layer is a thin layer of small glassy-like pebbles. And I was not able to separate that by the trench method; so, I gave it to you mixed up in the - that bag. And the last bag will be pebbles from the bottom layer.

Okay, Al. And about what's the thickness of the intermediate layer there?

Well, it's really ephemeral - it's (laughs) almost - it's very thin; I would say no more than a quarter of an inch thick, and I just noticed it because of the difference in the grain structure as I was digging the trench.

Roger, Al.

And in bag 20, 20, we'll fill a sample of the bottom material; also, mixed up with the - some of the surface material that's fallen down in on top of it. And that's about - call it 18 inches below the surface.

Roger, Al; and when you and Ed can work it in, we need another EMU check.

Okay.

This is Al, at 3.75 and reading - about --

Oh, hell.

Reading 35; I have no flags; and I'm in - MEDIUM flow now, going to MIN flow; and feeling good.

Okay, this is Ed. I'm 3.75 --
Okay, and what kind of misery are you having now, Ed?

3.75; 32 percent. MINIMUM - INTERMEDIATE - just a minute - I'm in MEDIUM cooling and doing great.

Now, my problem is I can't get the --

Okay.

-- driving down - driving down to that rock, I couldn't get the core cap off; I'm going to have to get some help from Al, soon as he puts his handful of samples down. Okay, that's great.

Okay, let me get rid of this trencher.

Okay. On the - on the agenda here, we have remaining documented samples, and we need a pan.

Roger. We'll get it for you.

Oh, God.

Get another one; skip it; we've got plenty.

Shit.

Yes.

Okay, Houst --

Okay. And, Al, one question. Did you get the SESC sample out of the bottom of the trench?

Well, I told you the trench was kind of a miserable failure, because the walls kept falling down. And I could get a sample from the bottom, but it wouldn't be the bottom, I'm afraid.

Okay, Fredo, the bottom - bit on this string was at - what - 23? Isn't it, Al? That's the one you got.

Twenty-three, right; 23.

Roger, Ed.
Okay, we need a pan from here; I can get that.

Okay.

Okay.

And, Al, when you get done with the pan, I guess we'd still like the SESC sample from the bottom of the trench, even though it probably isn't the bottom.

Well, I'll tell you, I'll go back and whack at it a little bit. See what I can do.

Okay. And, Al and Ed, we have about 8 minutes left here at Triplet.

Roger. You're still counting on a quick trip out to the ALSEP antenna?

That's affirm, Al. That's included in this time, and when - when you start out, we'd like you to make some grab samples as you pass by North Triplet.

Okay.

Fredo, the triple core tube, the second core didn't have anything in it. As soon as I opened it up, a little bit fell out; and the second core tube is empty, even though it drove down -

Roger, Ed.

- - even though it drove in about 3 inches, it didn't get anything.

Okay, Ed.

Okay, I'll put a bit back on that one. Save it.

Okay, and when you get done there, Ed, I guess you can proceed with getting some documented samples before we have to depart.

Okay.

Okay. SESC can - that's over in that pocket, right?
Yes.

Okay. Documented samples coming up.

This white stuff on the rim here, Ed?

Beg your pardon?

This white stuff on the rim here?

Yes. Document some of that. Here's a rock right here.

Okay, has Al moved over by the rim of North Crater, now?

Oh, no; we're still at the same place.

Negative.

That's pretty well disturbed, Al; I'll grab it - I'll grab it without much documentation.

Okay.

We're digging the bottom of the trench for you, Fredo.

Okay, Al.

I'm redigging the trench.

I'm picking up one of the - so-called whiter rocks, Fredo, near the area where Al is digging. Since it's already disturbed, I'm not going to waste time on much documentation. Kind of a kicked-up rock.

Roger, Ed.

Man, it's going into 25-Nancy.

Okay. We have about 3 and a half minutes left at Triplet.

Okay, we're packing up now.

One more documented sample.
Okay, there is a special request. Rather than grab samples at the North Crater rim there, they'd like to get a documented sample of a partially buried rock.

Okay. I was going to try to get you one of those right here, but it looks pretty big. I think maybe I can get it, anyhow.

Okay, Ed.

Oh, no!

What's the matter?

I can't believe it!

What's the matter, Al?

Oh, that - seal came off that thing, and -

Okay, Ed and Al, we're going to have to be departing Triplet here - and that one brief stop at the north rim to pick up one documented sample - and get on back to the LM area, if we're going to pick up the remaining tasks there.

Okay. Okay, you're right.

Fred, this documented sample that I got of the buried rock, it's too big for our regular weigh bags. See what I can do with it. The regular sample bags - I'm sticking one over it, but it'll never close. Okay, it's going in it. And will probably stay, but it won't close it. It's bag number - -

Okay, that'll probably be all right, Ed. We're going to have to move out, now.

It's bag 26-N.

Okay, Ed.

Okay. I'll grab the gnomon. We're on our way.

... the last I see of that son of a bitch.
05 14 46 29 LMF  They're miserable, aren't they?
05 14 46 36 CDR  Okay.
05 14 46 40 LMF  Oh, let me grab it for you.
05 14 46 42 CDR  What? That thing? What? What do you mean - that can?
05 14 46 46 LMF  Yes.
05 14 46 47 CDR  Forget it.
05 14 46 48 LMF  Okay.
05 14 46 49 CDR  We're never going to use it again. Okay, headed for the LM, and we're probably about 2 minutes away from the LM, Houston.
05 14 47 05 CC  Roger, Al.
05 14 47 09 CDR  Okay, everything's on so far.
05 14 47 39 CDR  Okay, we're -
05 14 47 41 LMF  We're close ... 
05 14 47 43 CDR  Here's the - -
05 14 47 46 LMF  Triplet right up ahead of us.
05 14 47 48 CDR  Could be.
05 14 47 49 LMF  We'll have to do a little bit to the north to get around it, I think.
05 14 47 54 CDR  Yes.
05 14 47 56 LMF  We're approaching Triplet from the - from the - east, North Triplet from the east. There's some - a little rock field down here - a small boulder field, Al, to get a documented sample from.
05 14 48 16 CDR  Okay.
05 14 48 21 LMF  Looks good. Yes, looks like they might have come from there.
05 14 48 26 CDR  Oops.
05 14 48 28 LMP  Did you lose something?
05 14 48 30 CDR  You lost you know what.
05 14 48 33 LMP  Oh, no. What?
05 14 48 36 CDR  (Laughter) This shiny can.
05 14 48 38 LMP  Damn SESC, huh?
05 14 48 42 CDR  Okay, the shiny can is retrieved. Press on. Going
to have to mush, Ed, right down the middle and get
a documented sample there.
05 14 48 54 LMP  Okay.
05 14 49 00 CDR  Man, that pile of rocks - beautiful, right there -
right to your left. Oh, just the right size.
05 14 49 08 LMP/CDR  Okay.
05 14 49 09 CDR  Don't walk over them!
05 14 49 11 LMP  No, I'm trying to stay away from them.
05 14 49 12 CDR  There you go.
05 14 49 13 LMP  Are these the ones - the ones over here?
05 14 49 15 CDR  Yes.
05 14 49 16 LMP  Okay.
05 14 49 18 CDR  God damn that thing.
05 14 49 21 LMP  Okay.
05 14 49 27 LMP  Gnomon is in place.
05 14 49 34 CDR  Okay, why don't -
05 14 49 36 LMP  I'll get the - Go ahead. I'm on this side; I'll
get the stereo.
05 14 49 42 CDR  Okay.
Get the locater.

Can't even see the camera settings.

Yes, that's got so much dirt on them. Okay, 7 foot ...

Okay, Ed and Al, as soon as you wrap this one up, we're going to have to press on back to the LM, or we're going to be really tight on the closeout.

Okay.

Okay.

All covered with dirt, huh?

Yes. God damn, it's bigger than we thought. Al, we'll grab-sample that one; I'll get you another one here.

Okay. Listen, just put it in that - in that thing. And let's press - because we don't have the time.

All right. I'll grab it, and let me take a picture - an extra picture here.

All right. I'll grab one right here in the foreground.

Okay.

Okay, bag 27-Nancy. And another documented sample --

Roger, Al; 27-Nancy.

-- a larger documented sample than we thought we were getting here, Fredo. Again, it was a buried rock; and it's too big for the sample bag; so, it'll go into the weigh bag.

Put it in that one right there. Can you get it?

Yes.
05 14 51 27  CDR  Okay.
05 14 51 28  LMP  It has a very definite shape; I think you'll be able to sort it out.
05 14 51 33  CDR  Okay.
05 14 51 34  LMP  Okay, let's mush for the LM.
05 14 51 36  CDR  Okay.
05 14 51 42  CC  Okay, Al and Ed. I guess we can skip the rim of North Crater and proceed right on back to the LM area.
05 14 51 50  LMP  That's where we are. We're at the - we're at the rim of North Crater, on the west - -
05 14 51 58  CC  Okay.
05 14 52 00  LMP  - - rim of North Crater.
05 14 52 01  CC  I think you misunderstood the message. We can proceed right on by the rim. We have the buried rock samples now, and head on back to the LM.
05 14 52 14  LMP  That's right. That's where we're headed.
05 14 52 16  CC  That's the Antares.
05 14 52 17  CDR  Okay, that's where we're headed. Hold it.
05 14 52 27  LMP  I'll get it; keep going. He lost the core tube.
05 14 52 32  CDR  Okay. Got it?
05 14 52 34  LMP  I'll have it in a minute. I got it.
05 14 52 48  CDR  Okay.
05 14 53 20  CDR  Everything still hanging on?
05 14 53 22  LMP  Yes. Everything is still there.
05 14 53 27  CDR  Good.
05 14 54 00  CDR  Okay, we're approaching the LM now. Coming in to Fra Mauro Base.
Roger, Al; and I guess from here, we'll - we can split up; and Ed can take the MET and proceed to the cluster of boulders he had reported earlier to the north of the LM, and you can proceed out to the ALSEP.

CDF/IMP: Okay.

CDF: I'd suggest - well, you can do it the way you want to - I guess you can do without the LM.

LMF: Without the MET, yes.

CDF: Without the MET, because there's nobody to - if anything falls off, we've lost all those goodies.

LMF: I think I'll just take a couple of rock bags - -

CC: Okay, that's it.

LMF: -- Fredo, my tongs and camera, and go.

CDF: Okay, Al's on the way.

CC: That's a good point, Ed. Yes. That'll be fine.

LMF: Okay. Al's on the way out to the ALSEP.

LMP: As a matter of fact, Fredo, I'm just going to take a weigh bag and no sample bag; that way I can get more. The size of these rocks, I - the sample bags are too small, anyhow.

CC: Roger, Ed.

LMP: Houston - -

CC: Okay, Al, the first thing when you get to the central station - is to check the alinement and verify the alinement and leveling.

CDF: Okay, I'm just going to go through the same procedure as I used during the setup; that is - -

CC: Okay, and I got - I got a change for you on the azimuth.
05 14 55 54 CDR

All right. Let me give you a call when I get there, and when I'm alined and level.

05 14 56 33 IMP

Okay, Fredo, my plan: I'm out in the area of the boulder field; I'm going to photograph many of the boulders, the rocks, the broken ones, the big ones, what have you - and then, grab as many of the different fragments as I can around these piles of broken boulders. I - now that I'm here, I see a large number of inclusions - I can't tell whether they're crystals or not - I think that they are. And I'll grab as many of these - and give you before and after shots as I can - of a whole weigh bag full of rocks.

05 14 57 09 CC

Okay, Ed. That sounds great.

05 14 57 18 CDR

Okay. The center alinement on the ALSEP has changed very little. Ought to be a slight change in the bubble level. Stand by.

05 14 57 32 CC

Roger, Al.

05 14 58 09 CDR

Okay. Alined and level. Go ahead with your readings.

05 14 58 13 CC

Okay, Al. The - setting we need is now - actually a change in the azimuth reading to 16, 16.00.

05 14 58 30 CDR

16.00.

05 14 58 35 CDR

Okay, you have 16.00, and you have --

05 14 58 39 CC

Okay, would you verify elevation is still at 6.41?

05 14 58 44 CDR

6.41 is still elevation. Stand by --

05 14 58 49 CC

Okay, stand by 1, Al.

05 14 58 51 CDR

Okay.

05 14 59 22 CC

Okay, Al. You can proceed back to the vicinity of the LM; and with the time remaining that you had for the ALSEP, shoot a few closeup pictures here. We've got about 4 minutes left.

05 14 59 35 CDR

Okay. Are the ALSEP signals satisfactory?
That's affirmative.

Okay. Heading back to the LM.

And, Al; Houston.

Go ahead, Houston.

Okay, a little change in the priorities. When you get back to the LM, we'd like the TV turned to look at the MESA area, so we can watch the closeout, number 1; and then, you can shoot a quick picture of the solar wind.

Roger; I'm going for the camera, now.

Okay. And we haven't changed the settings, Al; so, it's - it should - should be in good shape when you turn her to the MESA.

Okay. We'll be setting at 22.

Okay. We need a little more to the right, Al.

Yes. I'm just setting it up, Fred.

Okay.

Okay, that's f/22. How does that look?

Well, should - a little more - more to the left. Just a minute.

I'm shooting f/22 in peak. How does that look?

Okay, if you can tilt it just up slightly, Al, that'll be it. That's good. You got good azimuth on it, now.

Okay. How's that?

Okay, that's great; and you can go shoot the solar wind, now.

It's on the side of a hill; that's a problem out here.
Okay, Fredo, I'm heading back from the boulder field. I've sampled two of the larger boulders in the area. Rocks broken from them and lying on them; and I've taken a PAN. And I have a - maybe a third of a weigh bag full of small rocks from these boulders.

Okay; very good, Ed. We need to proceed now with the regular program.

Okay.

What setting would you like on that solar wind shot, Fredo?

Stand by.

Okay, Al. I'd go ahead and use your - your standard down-Sun picture if that's the direction you're shooting it in. They don't have an input here.

All right.

Okay, the last - just got an input. They want f/11 at 1/25th.

Okay. Will do.

And, Al; Houston.

Go ahead.

Okay. They'd like for you to return your camera so you don't have to bother removing the magazine from it. You can just put the whole camera in the ET3.

Roger.

Okay, and, I guess, so you don't get confused, that means we'll be bringing back both cameras.

Yes, understand.

Okay. Al's camera is in, and magazine Lima-Lima has got a 109.
05 15 06 18  LMP  Okay, Houston. And I understand now the contaminated sample under quad 3 is not to be taken?
05 15 06 30  CC  That's affirm, Ed.
05 15 06 32  LMP  Okay.
05 15 06 33  CDR  Okay, I'm putting my camera in the ETB. Let me slide by you there just a minute.
05 15 07 06  CC  Okay, Ed; Houston.
05 15 07 07  LMP  Go ahead.
05 15 07 13  CC  I stand corrected. What they really wanted was to bring Al's camera back, instead of yours; so, we'll only be bringing the one camera, the CDR's.
05 15 07 29  LMP  Okay, Houston.
05 15 07 35  CDR  ... excuse me just a minute.
05 15 08 01  LMF  Right. Right. Fredo, correct me, now; MAG Kilo-Kilo has never been used. Isn't that correct?
05 15 08 11  CC  Stand by.
05 15 08 15  CDR  Houston, while you're looking that up, you might recognize what I have in my hand as the handle for the re-contingency sample return; it just so happens to have a genuine six iron on the bottom of it. In my left hand, I have a little white pellet that's familiar to millions of Americans. I drop it down. Unfortunately, the suit is so stiff, I can't do this with two hands, but I'm going to try a little sandtrap shot here.
05 15 08 51  LMP  You got more dirt than ball that time.
05 15 08 56  CDR  Got more dirt than ball. Here we go again. Here we go.
05 15 09 01  CC  That looked like a slice to me, Al.
05 15 09 03  CDR  Straight as a die; one more.
05 15 09 18  CDR  Miles and miles and miles.

CONFIDENTIAL
Very good, Al. And to answer Ed's question earlier there; Kilo-Kilo was used for the window shots, Ed; so, you ought to bring it back.

Hey, that's right. We got some of that to start with, didn't we?

Yes.

Okay.

How many films did we take with this? Seven, huh?

Approximately. Seventeen; okay.

Okay, Ed; Houston.

Go ahead.

One additional item on the return is to bring back the 100-foot tether. That should also go in the ETB.

Okay. Okay, there's three cassettes and three frames.

Okay. The closeup camera cassette is removed, Fred.

Roger, Ed.

And stowed. That'll go in there?

Houston, do you read me?

Think that'll clear?

Yes. Okay.

Loud and clear, Al.

Okay, tell me about this tube, Ed. Has this got anything in it?

No, that's - that's one that's left - nothing in it. Before you throw it, get the number. That's the tube that we didn't get anything from.
Okay. Okay. In SRC-2, Fredo, we have the organic control sample, and we have four core tubes.

Roger.

And let's see -

We have one SESC.

Get it in without dropping it again.

Okay.

Okay, where's the SWC bag?

It should be in the top of the MESA, Ed.

Also, in the SRC, we have -

This baby won't fit.

- one weigh bag, which is mostly documented samples.

Closed --

Roger, Al.

-- Closed.

Okay. That supposed to go in here, too?

No, that's the - it goes in the ETB.

Okay. Take out - the core tubes out, maybe.

Okay.

Get the rocks in.

This baby's what's hurting us.

We didn't get anything in that magnetic sample container, did we?

No, we did not. TDS stuff's up there.

I've got it.
05 15 16 32 CDR
Good.
Your feet are about to get tangled up in the TV cable again. Don't fall.
05 15 16 37 LMP
Okay.
05 15 16 41 CDR
Oh, my God. Scratch.
05 15 16 57 CDR
Okay. Contaminated samples, scratched; 30-millimeter camera MAGs; 16 MAGs; closeup camera MAGs; SWC; TDS; magnetic sample - we didn't get a magnetic sample; map. Say, are you going to have any weigh bags?
05 15 17 04 LMP
Yes, we'll have some weigh bags. These two.
05 15 17 25 CDR
Okay.
05 15 17 39 CDR
Okay. Can you get them? Okay.
05 15 17 44 LMP
Houston. That completes SRC-1; then we have the - the organic control sample, one SESC container, four core tubes, and one bag of documented samples.
05 15 18 07 CC
Roger, Al.
05 15 18 10 CDR
Okay. Now, can you fit -
05 15 18 20 LMP
This is what?
05 15 18 21 CDR
- this rock in this bag, if we put it this way?
05 15 18 26 LMP
I'll give it a try. Wait for me there, just a second ... 
05 15 18 37 CDR
No, it won't go.
05 15 18 39 LMP
All right. We need the plus-Z 27 bag, right?
05 15 18 44 CDR
Yes. Either that or else put that in the weigh bag and take this up with it.
05 15 18 54 LMP
All right, I'm getting you a bag for it.
05 15 18 56 CDR
Okay, we'll use that one then. Here's your two-way bags that go in the ETB.
05 15 19 05 LMP  How are you fixed for room there?
05 15 19 08 CDR  I'm getting loaded. We'll probably have to make two trips.
05 15 19 14 LMP  Okay. Let me - babies right here, so we don't lose them.
05 15 19 55 CDR  Okay. I'll put that in the weigh bag on my next trip. Thank you.
05 15 20 00 LMP  That can just be a separate trip by itself.
05 15 20 02 CDR  No. Yes, okay ... to hold it up.
05 15 20 03 LMP  Okay. Now, have you got everything else? Got all the others in here?
05 15 20 10 CDR  Yes, let me do one more check here. See if we got some more in this bag.
05 15 20 16 LMP  These weigh bags are going to be - You're going to make a sep - separate trip out of them, huh?
05 15 20 19 CDR  I guess we'll have to, Ed. I sure can't get it in there, now.
05 15 20 27 LMF  Okay. Fredo, how much time have we got?
05 15 20 34 CDR  We should be in pretty good shape.
05 15 20 40 LMF  Houston, how much time do we have left?
05 15 20 47 CC   Stand by, Ed.
05 15 20 56 LMF  That do it now for those other items?
05 15 20 58 CDR  We've lost a bunch of them - -
05 15 20 59 CC   Okay, we've got about 18 minutes now.
05 15 21 03 LMF  Oh, we've got lots of time; okay. Watch your feet again.
05 15 21 07 CDR  Yes, I'm watching them. Okay. You have the ETB stowed, right?

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05 15 21 14 LMP ETB's stowed.
05 15 21 15 CDR How are the SRCs doing?
05 15 21 17 LMP Okay.
05 15 21 18 CDR And I'll see what we got left. There's the greatest javelin throw of the century!
05 15 21 29 LMP See if it is.
05 15 21 31 CDR Old Lefty, himself. Outstanding! Right in the middle of the crater. Stood up.
05 15 21 38 LMP Stabilized - wasn't bad at all.
05 15 21 40 CDR Beautiful. Beautiful.
05 15 21 48 LMP Okay.
05 15 21 49 CDR The documented sample bag.
05 15 21 50 LMP Okay. We missed one there, didn't we?
05 15 21 51 CDR Put that in the weigh bag.
05 15 21 58 CC Okay, Ed. I didn't hear the solar wind called off there. Did you get that one stowed?
05 15 22 05 LMP Yes. Yes, Fred. It's in the ETB now.
05 15 22 19 LMP Okay. We'll just have these three weigh bags now.
05 15 22 24 CC Okay, and did - okay, did the 100-foot tether also get into the ETB?
05 15 22 28 LMP That's affirmative; it's there.
05 15 22 34 CDR Okay. Okay; we'll take - take those along.
05 15 22 45 LMP Yes. How we going to handle them?
05 15 22 51 CDR I'll put them here in the ...
05 15 22 53 LMP Okay.
And, Al and Ed, I just wanted to check once again on the camera MAGs to make sure you got four 70s and four 16-millimeter MAGs. I guess one of the 70s is on a camera.

That's affirm, Fredo.

There's nothing left on the MET.

I think we've cleaned it all.

Okay.

Okay, let's press on. You want to -

Want to head on up the ladder? I'll hand you the SRC. I believe if you stomp your feet on the way up, it'll be as effective as the brush was yesterday.

Okay. You're probably right.

Okay.

Did you - I saw you over here. Did you get a picture?

I did.

With the LM in the foreground?

Yes.

Yes. Okay, you ready to go up?

Sure.

All right, Fredo. I'm starting up the ladder.

Roger, Ed.

How's that doing?

Looks good. Shaking the heck out of the LM.

What?

That's enough of that. Moving the footpad.
05 15 24 53 CC  Okay. Something must have got caught in the cable; we just saw the TV go over.

05 15 25 00 CDR  Well, we finally did it to you. Sorry. I'll check it out as soon as I --

05 15 25 04 CC  Okay.

05 15 25 05 CDR  I'll go set it - I'll go set it back up again. Got it?

05 15 25 08 LMP  Okay.

05 15 25 13 CDR  Okay. Fix up the television camera.

05 15 25 44 CDR  Okay, Fredo. You're going to have a real practical problem here. Probably be able to see what the lunar dust does to a camera lens.

05 15 25 54 CC  Okay.

05 15 25 57 CDR  Aim it back at the LM. Do you see anything at all?

05 15 26 06 CC  Yes, I think it's a better picture. Lunar dust helps the TV picture, I guess.

05 15 26 08 CDR  (Laughing) Okay, we'll see to it that all TV lenses get dusted in the future; if - cut you down four stops, Fred.

05 15 26 21 CC  Yes, that looks - yes - just about had it centered there. That's good, Al.

05 15 26 29 CDR  Okay.

05 15 26 32 LMP  Did you see that mighty leap, Fredo?

05 15 26 35 CDR  Okay, Ed, you can start on up now.

05 15 26 38 LMP  I'm already halfway up.

05 15 26 39 CDR  Okay, good show.

05 15 26 41 LMP  Rock box in one hand.

05 15 26 47 CDR  Okay.

05 15 27 07 CDR  How are you doing?
Fine. Let me get some of my visors up here so I can --

Okay.

How far back do I have to look?

That far?

About there.

Yes, I'd say about there.

Oh, I'm looking the wrong way.

Okay, shall we press on?

... seconds. There it is.

We got two loads of the ETB.

Okay. There you go.

Okay.

Said to have a quick look at Earth from the --

Yes.

-- surface.

Oh, we have some pictures of the LM in the foreground; so, hope it comes out all right.

Pretty small sliver left, isn't it?

Yes. Not much.

Okay, Ed, you take the first ETB as soon as you're ready and then we can run the tracker light thing in between. Okay, stand by. You ready for it?

Hear me, Ed?

Okay.

Houston, do you read?
05 15 29 14 LMP You read me, Al?
05 15 29 15 CDR Yes, I read you.
05 15 29 16 CC Roger, Al. Houston reads you loud and clear.
05 15 29 17 CDR Yes, I read you, Al - Ed.
05 15 29 21 LMP Okay, I'm ready to bring it up.
05 15 29 23 CDR Okay, stand by. I'm going to get around a little bit more here. Okay, let her go.
05 15 29 28 CDR Very good.
05 15 30 39 CDR Fredo, is the ALSEP antenna still doing okay?
05 15 30 45 CC Stand by, Ed. Roger, Al. They're getting good signal.
05 15 30 52 CDR Okay, that's good.
05 15 32 25 LMP Okay, Al, bring it down.
05 15 32 27 CDR All righty, coming back down.
05 15 32 42 LMP Okay, hold it there. Okay.
05 15 32 47 CDR Okay, I have it. Little more.
05 15 32 51 LMP Huh?
05 15 32 52 CDR A little more down, please.
05 15 32 54 LMP Okay, you got it?
05 15 32 55 CDR Okay. I've got it, now. Thank you.
05 15 33 03 CDR Okay. Hook on there. ...
05 15 33 52 CDR Okay, that bag is so big it won't pull in the ETB very well; I'll just bring it up by myself.
05 15 33 59 LMP Okay. You ready to bring the other two up?
05 15 34 02 CDR Just a second.
Okay, you can take the string now, if you like.
Okay. There she comes.
Okay, it's all yours.
Okay, I've got it.
Want to check the tracking light now, before I come up?
Yes. Got your eye bones out of the way?
I'm not looking at it. Let me know when you turn around.
Okay, ... Your track light, closed. Okay, here it comes.
Okay. Let's see. Yes, track light's working.
Okay. Okay.
Okay, Houston. Crew of Antares is leaving Fra Mauro Base.
Roger, Al. You and Ed did a great job. Don't think I could have done any better myself.
That's --
Well, I guess not now, Ed.
Okay, the dust is knocked off.
How'd you like one more bag of rocks?
Okay, if you'll take one LEC.
Okay. Can't see you - Wait a minute. Let me get -
Wait a minute. I'm just about to it.
Okay.
I'm running out of room in here, Al. Take this while you're at it, before you come in.
Okay.

Okay. The condensate [?] tank has already been discarded, Houston.

Roger, Al.

Okay, and --

Could you push it a little further?

Huh?

No. Okay. Now I've got it.

Get it up on top of the pile.

Man, the pile is high in here, too. Two ETB loads, an SRC, and an extra rock bag.

Okay.

Okay.

If you're ready, get over behind the door, and --

Okay. That's all of it. I'm moving out of your way.

-- come on in.

There's something caught in the door. Okay. I see what it is. It's that --

Thing down there, huh?

Okay. Push it *** The helmet bag strap. Okay. And, Al, it looks like there's a piece of Velcro laying right in the door. Can you reach it before I pull the door closed? That's it. It's one of those off the MET.

Yes.

All right, come on in.

Okay.
05 15 39 45  CDR  We have to have more door than that, Ed.
05 15 39 47  LMP  All right, just a minute. Wait a minute; back out, Al. I've got to turn. Okay, now come on in.
05 15 39 55  CDR  Beautiful.
05 15 39 59  LMP  Okay, straight up. Straight up here.
05 15 40 06  CDR  Okay.
05 15 40 07  LMP  Fine shape.
05 15 40 11  CDR  All righty.
05 15 40 22  CDR  I keep hitting on something back here.
05 15 40 24  LMP  Yes, you're hitting on the - shelf.
05 15 40 27  CDR  Okay.
05 15 40 31  LMP  Now you seem clear. Okay, Houston, the door is closed. Let's take this ***
05 15 40 47  LMP  WATER valve is CLOSED.
05 15 40 49  CDR  Afraid you'll have to - ... the suits.
05 15 40 58  LMP  The FEEDWATER valve is CLOSED.
05 15 41 00  CDR  Okay, let me go down and get the forward hatch, and I'll lock it.
05 15 41 14  CDR  Okay. The forward hatch is closed and locked.
05 15 41 17  LMP  Okay. Say, can you get the dump valve while you're there?
05 15 41 20  CDR  Yes. Okay, dump valve, AUTO.
05 15 41 29  LMP  Okay. Dump valve, AUTO. ...
05 15 41 34  CDR  Let me just check that -
05 15 41 39  LMP  Okay.
05 15 41 42  CDF  All righty.

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Okay. Look out. You're caught again. There, you're all right.

Okay.

Okay. LIGHTING: ANNUNCIATOR/NUMERIC, BRIGHT.

Okay.

CAE, in REPRESS, I'm turning to get it - to turn it to AUTO.

CAEB REPRESS, AUTO.

Okay. SUIT PRESS circuit breaker coming closed.

Cabin pressurizing. Standing by for your 0_2 valve.

Okay, Houston. The cabin is repressurized.

Very good, Antares.

Okay. PRESS REG A and B going to CABIN. And you can turn your PLSS oxygen off at 2 and a half.

Okay. We're at 2.5.

2.5; PLSS 0_2, OFF.

PLSS 0_2 is OFF.

Okay. CABIN warning light is off.

Okay. We're at 5 pounds.

Steady at about 4.6.

Can't beat pressurized air.

Okay. The DET is counting up. Okay.

Okay. Verify EVA circuit breaker configuration.

Okay.

Mine's good.
Okay, mine's good.

SUIT FAN 2, closed; SUIT FAN DELTA-P, closed; ECS caution and WATER SEP component lights, out. ... up. Are they out? Okay. We can doff gloves.

Okay. Gloves off, stow on the comm panels. Verify the safety's on the dump valve, which it is. Go DESCENT WATER valve, OPEN.

Okay. Okay, DESCENT WATER valve is OPEN.

Okay.

Okay. Purge valve.

Let's see. Have we got - that?

Pardon?

Yes. I just checked - rechecking it, to be sure we had everything. Okay. Purge valves. Stow in the purse.

Okay.

And disconnect the -

OPS O₂ hose.

OPS O₂ hose, somewhere.

Right there. Okay.

Okay. Connect LM O₂ hoses red to red and blue to blue.

PUMP, OFF; and FAN, OFF.

Stand by 1, Ed. Would you verify this hose for me?

Okay.

Okay. They're locked.

Okay. SUIT FLOW. Yes.

PUMP, OFF; and FAN, OFF.
05 15 48 08 CDR  Good. PUMP, OFF; and FAN, OFF. PLSS water from PGA. ... this way, babe. Okay.

05 15 48 28 LMP  Okay, there's your water.

05 15 48 29 CDR  And connect LM water to PGA. ... want to go? ...

05 15 49 06 LMP  Got it?

05 15 49 07 CDR  Yes. Got that one.

05 15 49 25 LMP  It's a real bitch, isn't it?

05 15 49 28 CDR  Okay. Okay; close the LGC [sic] PUMP breaker.

05 15 49 36 LMP  LCG PUMP breaker is closed.

05 15 49 38 CDR  Okay. PLSS mode, both, to 0, and connect to the -

05 15 49 49 LMP  Okay. Now wait a minute. Do you - Let's do it together.

05 15 49 50 CDR  Yes.

05 15 49 52 LMP  Both set our panels alike.

05 15 49 53 CDR  Yes.

05 15 49 57 LMP  And we'll talk and set it up so that ...

05 15 49 58 CDR  Okay.

05 15 51 26 CDR  Okay? Going to 0.

05 15 51 37 CC  Okay, we're on spacecraft comm now, and we're proceeding with the PLSS OFS undoffing - doffing, I should say. Okay -

05 15 51 39 LMP  Roger, Al.

05 15 51 41 CDR  Okay, verify that.

05 15 51 41 CDR  Okay, S-BAND TRANSMITTER/RECEIVER, PRIMARY. VHF: OFF, OFF, OFF; and OFF, LEFT, HI. And RECORDER, OFF.
Okay, we're at ICS/PTT.

Okay, and RECORDER, ON; VHF ANTENNA, AFT.

VHF ANTENNA, AFT.

Antares, Houston. You can treat BATs 2 and 4 per the checklist. Over.

Okay, here we go. BATs 2 and 4, OFF/RESET.

Okay.

Talkback barber pole.

2, coming off. And it dropped. 4, coming off. It dropped. 5 and 6 - are carrying the load.

Okay. DESCENT BATs, DEAD FACE?

DEAD FACE.

Okay. DESCENT ECA and ECA CONTROL, open.

ECA and ECA CONTROL are open.

DESCENT ECA and ECA CONTROL, open here.

Okay.

Okay. Give me a circuit breaker configuration.

Okay, on your panel?

Yes.

One, out; four, in.

Roger.

One, out; two, four, six, seven, in.

Okay.

One, out; one, in.
05 21 32 18 CDR Right.
05 21 32 19 LMF Three, out; one in.
05 21 32 20 CDR Right.
05 21 32 21 CC Antares, Houston. Both batteries 5 and 6 are looking good.
05 21 32 24 LMF Thank you. Next row, all in, except THRUST.
05 21 32 27 CDR Okay, verify.
05 21 32 29 LMF Next row, two, out; one, in.
05 21 32 31 CDR Okay.
05 21 32 32 LMF Two, out; two, in.
05 21 32 33 CDR Okay.
05 21 32 34 LMF One, out; two, four, six, in.
05 21 32 36 CDR Okay.
05 21 32 37 LMF Two, out; three, in.
05 21 32 40 CDR Okay.
05 21 32 42 LMF Next row, five, in; one, out.
05 21 32 43 CDR Okay.
05 21 32 44 LMF Two, in; one, out.
05 21 32 45 CDR Okay.
05 21 32 46 LMF Two, four, six, seven, in.
05 21 32 48 CDR Okay.
05 21 32 49 LMF Two, out -
05 21 32 50 CDR Three, in.
05 21 32 51 LMF Three, in.
05 21 32 52 CDR Okay.
Next row, two, four, five, in.

Right.

Two, out.

Right.

Four, in.

Is that four, in; or three, in?

I have four, in; and one, out.

Okay. This the last row you got on that?

Yes.

I got five, in; two, out.

That's right.

Four, in; one, out.

That's what I got.

Okay, good. ...

Okay.

Okay. Second row, in, all the way over to the DESCENT ENGINE OVERRIDE, which is out.

I can't hear you, Al.

In, all the way over to the DESCENT ENGINE OVERRIDE, which is out.

Okay.

Five, in.

Okay, good.
Okay. All right, in, all the way over to TV, which is out.

Okay.

One, in; one, out.

Right.

One, in; one, out.

All right.

Five, in.

That's good.

Okay. DESCENT ECA and ECA CONTROL are out.

Okay.

One, in; two, out; two, in.

Okay, I'm with you.

Okay, we're at 5 minutes.

Okay, RENDEZVOUS RADAR ... Okay?

Okay.

Okay, keep the book.

What's that noise? Is that the VHF?

No, I'd say - I suspect that's the relay. We'll try it. Yes, it's - it's B, it's VHF B.

Is it B?

It's VHF B.

Well, now.

I just - I turned the SQUELCH up. That'll help.

Okay.
05 21 34 58 LMP  Okay.
05 21 35 00 CDR  I'd turn up some more.
05 21 35 04 LMP  Maybe your VOX is too high, Al.
05 21 35 06 CDR  Say again --
05 21 35 07 LMP  Oh, we're not on VOX.
05 21 35 08 CDR  Say again.
05 21 35 09 LMP  I said maybe the - Never mind.
05 21 35 20 LMP/CDR  Okay.
05 21 35 21 CDR  Checking APS burn guidance.
05 21 35 22 LMP  APS burn guidance.
05 21 35 23 CDR  Why don't you turn VHF 2, OFF?
05 21 35 26 LMP  Say again.
05 21 35 28 CDR  Let's turn VHF B, OFF, unless you can get more squelch out of it.
05 21 35 31 LMP  Okay, I had all of my - had all the squelch I could get.
05 21 35 35 CDR  Okay, let's turn it OFF.
05 21 35 37 LMP  Okay, it's OFF.
05 21 35 39 CDR  No use listening to that.
05 21 35 40 LMP  Stu will be calling us before long, but not yet.
05 21 35 42 CDR  No, he's not here yet.
05 21 35 43 LMP  Okay, APS.
05 21 35 44 CDR  Right.
05 21 35 45 LMP  ENGINE OVERRIDE LOGIC is closed. All S&O circuit breakers, closed, except -
05 21 35 52 CDR  AEA and DECA POWER.
On your side, and ENGINE OVERRIDE on mine. Okay.
CROSS TIE, BALANCE LOADS is open on my panel.
RATE SCALE, 25.

ATTITUDE/TRANSLATION, 4 JETS.

4 JETS.

COUPLES, ON.

COUPLES, ON.

DEAD BAND, MIN.

MIN.

Pushbuttons, reset.

Pushbuttons, reset.

ATTITUDE CONTROL, MODE CONTROL.

Three, MODE CONTROL.

MODE CONTROL, two, AUTO.

Two, AUTO.

Stop pushbutton, reset.

Light's out.

Okay, it's reset. And mines out. TITSA, two of
them in JETS.

JETS.

Okay, I'm going to select 411; 11 plus 1000C
ENTER; and at 2 minutes, I'm standing by for
400 plus 1000.

Okay, we go right to this page.

Okay.

Okay, now I guess we still plan to go to VOX, huh?
Yes, sir.
Okay.
I'll call it, if they don't, if we need it.
Okay, BIOMED's reading LEFT; HI BIT RATE; ... have to select ... --

Haven't heard anything about sensors in the last couple of days.

Pardon.

We haven't heard anything about sensors in the last couple of days.

No, maybe they gave up.

Okay, Ed, get that. Okay.

Is everything secured over there?

Yes.
Okay, it's all secured.

Got a couple of bags that may come floating out, but - stick them down here, actually.

In with our rocks.

Okay, just hold one more time, and we've got it made.

Hey, god damn it.

What's the matter?

I'm still freaking with snaps down here. We've got everything snapped in. This is - They've always got about 15 of these things, you know.

Yes.

I think that'll hold it.

You're snapped over here. Everything's secured. You have your 5-minute checklist. The --
05 21 39 33 CDR PRIMARY RADAR breaker AC is in.
05 21 39 34 LMP Yes.
05 21 39 35 CDR Okay.
05 21 39 37 LMP Medical kit was loose.
05 21 39 50 LMF Okay. ... go into the big one.
05 21 40 01 CDR No, this is the little one. It's only half of the big ones.
05 21 40 14 CDR Okay, turn on the MASTER ARM at 1 minute. You can start the camera. Ten seconds, ABORT STAGE, push; ENGINE ARM, ASCENT. You give me a P9 at 5 and a 99.
05 21 40 26 LMF Will do.
05 21 40 28 CDR And I'm going to push this son of a bitch at plus 1 second anyway. Even if it was AUTO ignition - even if it wasn't AUTO ignition, it's going to get pushed anyway.
05 21 40 42 LMF Right. Well, I like your spirit (laughter).
05 21 40 43 CDR Okay. Yaw right, 30 and then we watch it.
05 21 41 03 CDR Okay, you'll probably be going to B now to see what we've got.
05 21 41 05 LMF Hell, it's quiet now. VHF B's quiet.
05 21 41 11 CDR Okay. I don't know what happened to it. Okay, it's - I think we have not settled. It's still about 6 and a half degrees.
05 21 41 20 LMF Yes.
05 21 41 24 CDR Okay. All we have to do is hang on 4 more minutes.
05 21 41 34 CC Antares, Houston. A mark at 4 minutes. Stand by.
05 21 41 39 CC MARK. Four minutes.
Okay, we're right with you. 240 thousand miles away. Okay, baby, we want you to fire. ASCENT HELOM, PRESS 2 is good. HELOM 1 is good.

Okay, GUDANCE, PGNS; MODE SELECT is in AGS; we're in H and H-dot. We're at LO MULT; okay, we have computer; we're in PGNS; 25; PROP, ENABLE; 4 jets; COUPLES, ON; MODE CONTROL, three, to AUTO. Right on the money. Boy, my visor's so scratched up --

Mine is too.

-- when the Sun shines in it, you can't even see --

See a cottonpicking thing. Okay, 3 minutes.

And the light level will decrease soon.

Yes, it won't be quite as bad when we get a little higher.

Kitty Hawk, Antares. How do you read?

Antares, Houston. Kitty Hawk is reading you 3 by on VHF.

Roger. We're not reading him. And Antares is counting -- counting down to 2 minutes; 3, 2, 1 -- MARK. Two minutes and counting.

We concur.

You son of a bitch. Okay, AUDIO MODE, both VOX.

All right, VOX.

400, set 10000.

Okay; 400.

400 plus 10000.

Plus 10000.

Okay.
Watch is reset.

Okay, Houston. The MASTER ARM is OK. The A and B lights are on. Okay. 367 read-out and ... in 1. ... , there's our boy. Read you loud and clear. We're 45 seconds and counting.

Okay --

Okay, hello.

--- be up to see you shortly.

Okay. DSKY's on time.

Have a nice cool one set up.

Okay. The ABORT STAGE is set. ASCENT ENGINE is ARMED. 6, 5, 4, 3, 2, 1, 0 --

IGNITION.

We have ignition --

What a lift-off!

--- And LIFT-OFF.

... pitchover.

There's pitchover. Ten seconds. Okay, baby. *** over is good. Pitchover. There's AUTO ignition.

Boy, and here we're going across Cat's Paw.

Watch the ball. Everything looks good, Houston. Coming up on 1 minute.

A1 --

2, 1 --

MARK; 1.

MARK; 1. Little bit low and slow, but it's --

Okay, you want to give me a 623?
05 21 46 58  LMP  Okay.  PGNS and AGS together.
05 21 47 02  CDR  Okay.  Yaw is complete, Houston.
05 21 47 12  CDR  Okay.  Let me look at the target again.  54829313.
               Targeting is still good.  Okay.
05 21 47 31  LMP  On 2.
05 21 47 34  CDR  Okay.  Coming up on 2 minutes.  3, 2, 1 -
05 21 47 39  CDR  MARK; 2.
05 21 47 40  LMP  H-dot is good.  H-dot's right on.  H is right on.
               PGNS and AGS are together.
05 21 47 49  CDR  Okay.  Steering is good.  PGNS looks good, Houston.
               ... luck.  Tight as a drum.
05 21 48 32  LMP  Okay.  Steering is still good, Houston; coming up
               on 3 minutes:  3, 2, 1 -
05 21 48 39  CDR  MARK it.
05 21 48 41  LMP  MARK; 3 minutes.  V_I is good, H-dot's good, H is
               ***, PGNS and AGS agree.
05 21 48 54  CDR  Okay.
05 21 48 55  LMP  Must have been oscillation - oscillation in our
               RCS pressures, but I'm sure it's ***
05 21 49 10  CDR  ***31.  Okay, Bruce.  Looks good here.
05 21 49 40  LMP  MARK; 4.
05 21 49 41  CDR  4, 4.
05 21 49 45  LMP  Fire is good.
05 21 49 47  CDR  Fire and pitch is good.
05 21 49 48  LMP  H-dot is good; H is good; AGS are right together.
05 21 50 03  CDR  Okay.
05 21 50 20  LMP  ... good.
Okay. Thank you. About 225 to go; out of plane looks good.

It looks good. That's good.

Okay, you can stop your camera, if you want.

Okay. ...

Okay. We're a little beyond 5. We go until 5:30.

We are at 5:30. 2 -

MARK it.

5:30. That is good; H-dot's good; H is good; pitch is good; PGNS and AG3 agree.

Okay. Let's take one more at 6:30.

All right.

Houston, we'll look at --

6:30's what you said.

Antares, this is Houston.

Okay. VERB 85 versus 500 for a minute.

... 8946.

Okay. I'll stay with 500.

Okay. Very good.

You're looking good. There's 800, 750, *** 550, 500. MAIN VALVES are OPEN --

Okay. MAIN VALVES, OPEN; ASCENT FEED, CLOSED.

-- ASCENT FEED, CLOSED. 350, 300, 250, 200, 150, 100, 80, 60, 50, 40, 30, 10.

SHUTDOWN.

Okay. We've had a shutdown on the PGNS.

CONFIDENTIAL
And those residuals are good.

*** STAGE, reset. *** button, push; KEY RELEASE.
Hit PRO.
Okay. ***

Here's your residuals --
Okay.
-- minus 0.8.
Okay.

*** when we shut down. Go with that, Al. Looks good.
Okay, minus 0.1, minus 0.4, plus 0.5.

*** close.

 *** extend. ***okay.

Say them again, Al. Minus 0.1, minus 0.4 --
And hold.
Okay. Pressing on with the checklist.
Okay. We can go IC ***T.
Okay. INVERTER - INVERTER 2 - I'm on INVERTER --
Antares, Houston. There will be a tweak burn. It'll come up shortly.
Okay.

Roger. All right, INVERTER 1 circuit breaker, open.

Just a minute. Let me get the - Be sure I got the right attitude. I'm in attitude.
Okay.
Okay. INVERTER 1 breaker's open.

Did you get plus or minus 5 SHAFT/TRUNNION?

Affirmative.

LOGIC POWER.

Antares, this is Houston. Tweak T_i 142:36:51. DELTA-V: X, minus 2.0; Y, plus 5.0; Z, minus 8.0 and this is at the nominal yaw 30 attitude. Read back.

Roger. 142:36:51. Minus 2.0, plus 5.0, minus 8.0. Okay.

Antares, Houston, did you copy the tweak turn? Over.

That's affirmative, Houston. We're setting up for it now.

Roger. 142:36:51, and minus 2.0, plus 5.0, minus 8.0.

Roger, Ed.

What was that T_i again?

36:51, Al.

Okay. 47's called up.

Getting AGS set up for you. Which axis you going to do first?

Okay, what's the biggest?

Biggest one is Z - minus Z.

Minus Z is minus 8?

Minus 8.

Okay, we'll do that first.

X, Z, Y, Ed. X, Z, Y.
Do X, Z, Y. All right, they want X, Z, Y.

Okay. 36 what?

51, 20 seconds.

And the first one is X, and that'll be what?

That's minus 2.

Minus 2.0. Minus 2.0?

Minus 2.0.

Okay.

Ready? Give it --

We're burning.

Good.

Okay.

B is minus 8.

Minus 8?

B, minus 8. Knocking down Z.

Okay.

Burn. 1, 2, 4, 5, 7 - 6, 7, 1 foot more. 5, 7, 9, -. -

Okay.

That looks good. 471 -

That's about - out of plane?

Out of plane is plus 5 right, 2 and a half, 4 and a half; that's great. Right there. Hold it.

Okay, Houston. Tweak's complete.

Okay. Let's get old P47.
Roger, Al.

Okay.

Okay.

... get in attitude.

Right.

Okay. We'll do it in RATE COMMAND. We got plenty of RCS? Yes.

Pardon.

Antares, Houston. You're GO for the APS TPI. APS TPI. Over.

Roger. Thank you.

Okay. You're slewing. Okay. When you get just a second - did you get LOGIC POWER circuit breakers, open?

LOGIC POWER A's open.

CABIN FAN circuit breaker, closed. CABIN FAN 1.

Wait just a minute, Ed.

Okay.

Antares, Houston. How do you read?

Loud and clear, Bruce. I'll look up for you as soon as we're in position.

Okay. We're about in attitude now. Okay, what are those breakers again?

Okay. CABIN FAN 1.

It's out. Do you want it out or in?

I want it in.

Okay. It's in.
Okay, Houston. We're locked up on the steerable. Okay. RENDEZVOUS rate - RENDEZVOUS RADAR mode L3C - -

Okay. ... -- Call P20.
2J's called.
VERB 80.
Well, we haven't -- Oh --
-- locked yet.
Haven't got it up yet.
No. Searching now.
Fardon.
I say it's searching now. I don't have a visual.
Okay. We'll give him a tracking light.
Okay. It's found him. Okay. 000003, we'll take that. We --
Antares, Houston. No state vector updates are required. Over.
Roger. Thank you. You move your hand a minute, Al?
Okay. You want a PRO on that?
And Stu reports he's having problems locking on in VHF.
Yes. Okay.
You haven't got a 50 18.
Beg your pardon.
You don't get a 50 18.

Not when you're within 10 degrees.

Okay. We'll go to AUTO and see what it does.

Am I supposed to have the tape recorder still on?

I don't know.

Should be a turnoff here somewhere. I guess not. We'll leave it on. I haven't got anything to do with it but run it out anyhow.

Okay. Let's get a VERB 80 going. Okay. And call 34.

Okay. We can set the counting down to TPI.

Okay. Have you got a Tig for me?

Have it in just a second.

Okay.

Tig is 143:10:54, Al.

25 ENTER; plus 143 ENTER; plus 10 ENTER; plus 54.00. Right?

Yes. Let me say it again, 143:10:54.00. That's a good number.

NOUN 37 is 143:10:54.00.

That's a good number.

Okay. PRO. It might not enter. Okay.

OPERATOR ERROR; okay.

Yes, I got that.

Okay.

Okay. We want a zero, we want a zero, we want a 130. Right?
You marked early. Okay. Let's get the COAS on; this is getting ready to go. Okay. What's next?

Antares, this is Houston. We believe that the command module VHF ranging lock problem may be due to conversation on the loop. Your conversation even over the intercom within the LM is enough to break it up and inhibit lock; so maybe you can get Stu to give you a mark when he's ready to throw the RANGING RESET switch, and then remain silent for about 20 seconds, both spacecraft. Over.

Understand.

Roger. We understand. Give us a call, Stu, when you need it.

Okay, Ed. You got an ORB RATE ball.

Okay. Coming up.

You got an ORB RATE ball.

Okay.

Through?

Are you through with 54?

Yes, I'm through with it.

Antares, this is Houston. We've been informed that all systems are looking good. In particular, BATs ...

He said everything's looking good, but then he lost us.

Yes, we broke - popped S-BAND ANTENNA breaker again.

Yes, was just like in the LMS and CMS. I don't see him.
Houston, Antares. I lost my S-BAND ANTENNA breaker again.

Antares, this is Houston.

Go ahead, Houston.

Antares, Houston. Request AFT OMNI and LO BIT RATE.

Okay. AFT OMNI and LO BIT RATE.

And you have it.

And it looks like your present attitude is blocking the steerable antenna from pointing at the Earth.

Maybe so, but it also popped a circuit breaker.

Roger. If it runs into the stop, I believe it will.

It didn't. It popped it before it went to the stops.

Roger. Out.

Okay. Range rate, 349, 3000 - ...

Okay. It's looking pretty good so far.

Sure is.

Sure you're on VHF B, RECEIVE, now?

I'm on B, RECEIVE, yes.

With all that noise?

Yes. That's the weird noises that Cernan was talking about.

Okay. Eighteen minutes. Should be 20 ... ECS.
Antares, Houston. Comm check; over.

Loud and clear, Houston. How me?

Roger. Out.

Core tube stopper.

Yes.

What time's LOS?

Okay; LOS in a couple minutes.

Okay.

Apollo 14, this is Houston. LM TPI ground solution, DELTA-V: X, plus 63 feet per second; Y, plus 1; Z, plus 67. I say again, LM TPI, DELTA-V: X, plus 63.0; Y, plus 1.0; Z, plus 67.0. Antares, over.

Roger. Copied plus 63, plus 1, plus 67. Thank you.

Roger. Cut. Ten seconds -

Yes, we lost them.

Okay. What's for LOS procedures, Al? You got them there?

Okay. TRACK MODE, SLEW; S-BAND ANTENNA, AFT.

Okay.

Set PITCH, plus 114.

Okay.

YAW, minus 46.

Okay.

BIOMED, OFF.
05 22 14 54 LMP BIOMED, OFF.
05 22 14 55 CDR PCM, LO.
05 22 14 56 LMP PCM is LO.
05 22 14 59 CDR UPLINK SQUELCH, ENABLE.
05 22 15 00 LMP Okay. It's ENABLE.
05 22 15 44 CDR Anyway, I didn't make the ... pullouts.
05 22 15 49 LMP Isn't this supposed to be cut - cut through?
05 22 15 51 CDR Is it?
05 22 15 52 LMP Yes.
05 22 15 53 CDR It's not. See how can slide it back and forth?
05 22 16 28 CDR There he is.
05 22 16 30 LMP Find him?
05 22 16 32 CDR Yes. There's sunlight on him.
05 22 16 43 LMP Give me a VERB 82. Let's see how we agree.
05 22 16 46 CDR Looks just like a star. ... --
05 22 16 53 LMP Ooh, I'd like to get these helmet and gloves off.
05 22 16 58 CDR You want to take them off?
05 22 16 59 LMP What?
05 22 17 01 CDR Want to take them off?
05 22 17 03 LMP Yes, I'd like to (laughter). There's no crap in the cat - in the cockpit.
05 22 17 10 CDR 8.65 by 50.9.
05 22 17 14 LMP Okay. I've got 50.3 by 4 - let's see, 403; E.L, so that's - we're right together, Al.
<table>
<thead>
<tr>
<th>Time</th>
<th>Role</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 22 17 27</td>
<td>CDR</td>
<td>Okay. And it looks good, babe.</td>
</tr>
<tr>
<td>05 22 17 31</td>
<td>LMP</td>
<td>Good solutions.</td>
</tr>
<tr>
<td>05 22 17 37</td>
<td>CDR</td>
<td>Looks good. Oh, I'm sorry. It's not him - it is not he. Thought he was moving, but he's not - just - don't see him at all.</td>
</tr>
<tr>
<td>05 22 17 46</td>
<td>LMP</td>
<td>VERB 62.</td>
</tr>
<tr>
<td>05 22 17 49</td>
<td>CDR</td>
<td>Glad we're not doing this visually.</td>
</tr>
<tr>
<td>05 22 18 20</td>
<td>LMP</td>
<td>4,1.</td>
</tr>
<tr>
<td>05 22 18 49</td>
<td>CDR</td>
<td>Everything's looking good. Everything's quiet.</td>
</tr>
<tr>
<td>05 22 18 53</td>
<td>LMP</td>
<td>Okay. I'm going to retarget PGNS here, I mean AGS here. 514,00000,515. Move your hand a bit. There's the problem. Plus 4 all zeros, 516, plus 00000. ENTER.</td>
</tr>
<tr>
<td>05 22 19 55</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 22 20 04</td>
<td>CDR</td>
<td>Okay. Everything's going very nicely.</td>
</tr>
<tr>
<td>05 22 21 00</td>
<td>LMP</td>
<td>Sounded like Stu went off the air.</td>
</tr>
<tr>
<td>05 22 21 02</td>
<td>CDR</td>
<td>Yes, it sure does.</td>
</tr>
<tr>
<td>05 22 21 04</td>
<td>LMP</td>
<td>Thought he was starting to - took a RESET RANGING set.</td>
</tr>
<tr>
<td>05 22 21 07</td>
<td>CDR</td>
<td>Oh, yes. ... any good.</td>
</tr>
<tr>
<td>05 22 21 11</td>
<td>LMP</td>
<td>... 2, 4, 42 ...</td>
</tr>
<tr>
<td>05 22 21 15</td>
<td>CDR</td>
<td>Sure are noisy.</td>
</tr>
<tr>
<td>05 22 21 42</td>
<td>LMP</td>
<td>Okay. I'm ready to - How about that - there's no use in being this miserable. Do you want to break helmets and gloves?</td>
</tr>
<tr>
<td>05 22 21 56</td>
<td>CDR</td>
<td>Well, we'll - we can put them on just before docking, can't we?</td>
</tr>
</tbody>
</table>
We can.
The only thing is we'll have a different configuration on the CABINS.
What we need to do is go CABIN, CABIN.
Well, AUTO on both, CABIN GAS RETURN.
AUTO on both of those.
Is CABIN holding?
I don't see any flow; it hadn't moved.
Okay.
Okay, Antares. I ... maneuver.
Okay, Stu.
Okay. We're in final COMP, 34.
Okay. You want to copy down the solution?
Yes. Just a second here.
You're going to have a transfer angle of 30 degrees.
Okay. Let's have a solution, NOUN 55. I don't need -
Begin the transferring with 30 degrees.
Just a minute. Let me write it down. Okay, you have 30.
30.16.
AGS says 29.86.
Good show.
You'll have to move those four to burn, because they'll end up down there. Okay, NOUN 58 - are 446 -
05 22 24 13 CDR 885, 287.
05 22 24 16 LMP 885, 287. All right.
05 22 24 21 CDR Okay. Here we go. 81 - boy, it's close to the ground.
05 22 24 27 LMP 621, plus 1, plus 631. That's pretty close to what - they gave us from the ground.
05 22 24 39 CDR It's really is.
05 22 24 58 CDR Okay. Stu, did you read our NOUN 81?
05 22 25 04 LMP Did you read our NOUN 81?
05 22 25 05 CDR Okay. We had 62 - plus 62 1, plus 0,1, plus 63 1, and I'll take yours.
05 22 25 08 LMP ..."""
05 22 25 19 CMP ..."""
05 22 25 30 LMP Okay.
05 22 25 33 CDR Getting pretty good on that sextant, huh?
05 22 25 37 CMP Yes ...
05 22 25 44 LMP That's affirm. We have VHF RANGING on A and RECEIVE on B.
05 22 25 50 CDR Do you want 59?
05 22 25 52 LMP No, I don't care.
05 22 25 55 CDR Okay.
05 22 26 06 CDR Okay. I'm going to call up 42.
05 22 26 09 LMP Pardon? Okay.
05 22 26 11 CDR Calling up 42.
05 22 26 15 LMP Okay. Our solutions are good enough. We'll go - go with your PGNS, Al.
Okay. Let me just change the adapter up in there.

Stu - Stu, we're going to burn plus 62.1, plus 0.1, plus 63.1.

Okay. Going to burn attitude. It's only 2 degrees off.

Okay. We're sitting in burn attitude.

Can you get the checklist while I finish targeting AGS?

Sure.

Okay. I need VERB 16. Could be NOUN 86 is -
Okay. 450, plus 00621, ENTER; 451, plus - 452, plus 00631, ENTER.

Okay, Stu. We're in burn attitude. Looks like we're going to make the burn all right.

Okay. You through with --

Okay. I'm through with those. You can have them.

Okay. Counting down at 40. You want to check your DISPLAY/ENGINE OVERRIDE/LOGIC, closed; and DESCENT ENGINE OVERRIDE's open.

Okay. What was the closed one?

DISPLAY/ENGINE OVERRIDE/LOGIC.

Okay, it's closed. DESCENT ENGINE OVERRIDE, open --

Okay.

-- is open.

RATE SCALE, 25; 4 JETS --

Okay. Let's get these helmets down.
05 22 28 23 CDR  BALANCE COUPLES, ON.  DEAD BAND, MIN ...  ABORT STAGE, reset;  MODE CONTROL, three;  PGNS, AUTO;  AGS, AUTO; ...  reset, reset.

05 22 28 43 LMP  I had to put it on to get rid of it.

05 22 28 50 CDR  Now, mine will be okay.

05 22 28 53 LMP  Yes, yours is all right.

05 22 28 56 CDR  Okay. One minute 56 seconds to go.  You had a 400 and a plus 10000?

05 22 29 04 LMP  400 and - plus 10000.

05 22 29 06 CDR  Okay.  Okay.  Okay.  To end, I'm going to put the ABORT - set the ABORT STAGE, start manual ullage, and I want you to PRC at 5.

05 22 29 24 LMP  Okay.

05 22 29 30 CDR  Okay.  At ignition, if no ignition?

05 22 29 33 LMP  ENGINE ARM, ASCENT;  MANUAL START, MANUAL STOP in 3 seconds.

05 22 29 36 CDR  Okay. You should have an ENGINE ARM, ASCENT before you get there, or somewhere.

05 22 29 40 LMP  Well, it - see, you're not - you're only arming with the abort stage; if you don't get it, go ENGINE ARM, ASCENT.

05 22 29 47 CDR  Okay.

05 22 29 51 LMP  And on and off.

05 22 29 53 CDR  Okay, 1 minute.  AGS, MODE CONTROL.

05 22 29 55 LMP  Okay.

05 22 30 17 CDR  Okay.  DSKY's on time.

05 22 30 40 CDR  Okay.  ABORT STAGE is set. Starting ullage.  6, 5, 4,-
05 22 30 47 CDR/LMP  PRO.
05 22 30 48 CDR  3, 2, 1. We have -
05 22 30 51 CDR  IGNITION. 31, shutoff.
05 22 30 56 LMP  Man --
05 22 30 58 CDR  Okay. We made the burn. --
05 22 30 59 LMP  -- Oh, man. What a burn!
05 22 31 02 CMP  Okay. Sounds like you got a good burn.
05 22 31 06 LMP  Boy, that's a wild ride, Stuart.
05 22 31 10 CMP  I've been told ...
05 22 31 14 CDR  Yes, we're trimming now.
05 22 31 46 LMP  Beautiful, Al; 0, 0, and 3. Let me write them.
05 22 31 50 CDR  Okay; C, C, plus 0.1.
05 22 31 52 LMP  Okay, you got them; 0, 0, plus 0.1. AGS is plus 0.2, 501, minus 0.5, 502, plus 0.4. Good burn.
05 22 32 23 CDR  Okay, Ed. Engine stop, reset. Now, we ought to get back into AUTO TRACK.
05 22 32 34 LMP  That's affirm. You should be in it.
05 22 32 38 CDR  Okay.
05 22 32 55 CDR  Radar needles are off.
05 22 32 57 LMP  Pardon. Say you got a 50 18 to take you back.
05 22 33 02 CDR  Okay. Just got a - I just - just came up - there you go.
05 22 33 15 CDR  Okay. We are back in attitude, and we're in good shape.
05 22 33 18 LMP  So, I just need to see the checklist. That's all right. 1909, and 15, 2059, 372 --.
Go ahead.
I was - I was wondering if I could ... see if I could get my VHF locked up?
Sure.
Say when you need it.
Give us a mark. We'll be quiet for 20 seconds.
Okay. 3, 2, 1 -
MARK.
Okay, Ed. I got - I got a ...
Hang on, we stayed 20 seconds --
That's pretty good.
Well, I ... what ...
Okay. VERB 67 is ir, loaded.
Yes, everytime you get a reset, Stu, give us a yell.
Okay.
Because we don't know unless you tell us.
All right.
1, 30, 2. ... 
Okay. How's your AGS doing over there?
Man, it's just staying right in there.
Good.
Just hanging in as pretty as can be.
Say, Stu. They tell us from Houston, now, they want us to plus-X thrust anyway, on the first docking attempt. Do you get that word from them?
Say again, ...

They called us from the control center a little while - well, before we left the surface, and said now on the docking - on the normal docking, the first attempt, they want us to thrust plus-X with you anyway.

Yes, that's what they said.

Okay. Well, I'll thrust plus-X, four jets then, when you give me a contact.

Okay.

I'm not sure I like it, but -

No, I'm not sure I will either. Why don't we go ahead and dock and see if we capture. And, if not, I'll give you a GO for thrusting.

I like that idea better. We'll just play it nominal first.

Okay. Let's just check the devil at TPI plus 6. The line-of-sight radar ought to be 52, and that's what it is. Line-of-sight reads good. Well, I guess we could go ahead and throw in a ... in there.

Did you reset your ball?

I haven't reset it. No, Al.

You want to give me a - -

I - Here's a number to reset it on.

Okay.

3922.

Okay. What does it look like? What - it's all right, isn't it?
40. It's pretty damn close. If you'll change - let me give you an apogee and perigee to reset on. There's 44 by - by 59, so it's 44 by 60.

... 4 is 52.

Okay.

Okay. Off and running.

Three degrees, and 21.

All, there's your docking light.

Yes, there he is.

Tracking light, I should say. There he is.

You reading - can you see our light, Stuart?

Oh, yes. Yes, he said that solution he had was sextant only.

Yes. That's right, he did, didn't he? 18 miles.

Okay. Final comp in 1 minute.

12, 16, 18, 19, 17.2 -

MARK. 17 -

MARK. 262 plus 00171. I have an 11-foot mid-course, but I wouldn't count too much on it. It's not enough marks.

We're just about right on the nominal track.

Okay. That midcourse is what I initialized after TPI. They're not very good.

... quite a few updates.

Yes, could be. You got a final - oh, you don't get a final comp until --

Right now.
Okay.

Right now.

Okay, there they are: 0.9, 0.2, and 0.6.

Okay, NOUN 81. Stu, you ready?

Roger.

Minus 0.9, plus 0.2, minus 0.6.

Minus 0.9, plus 0.2, minus 0.6.

That's right, and I think we'll burn it RCS.

Okay. Mine are plus 1.3, minus 0.1, minus 1.1.

Not bad a-tall. Not bad a-tall. Everything's right direction; very close.

Okay.

You got them?

Yes.

Okay. You're in ATT HOLD, going AGS -

AGS. I will be.

Okay. Which one are you going to burn first? It's nearly all X, right now.

Oh, I wiped it out.

VERB 16 NOUN 85 - -

VERB 16 NOUN 85. You always burn X first.

Did you write down the 81s?

No, I didn't, Al.
Oh, okay. Probably better ought to do that.
Well, I can tell you what they are, because I --
Well, I mean for - you know - debriefing --
Yes.
-- later on. Okay --
I did write them down, too. In here.
Okay, Stu, we'll do it. On time.
Okay, we're burning.
Burn complete. Okay. Plus 0.1 in all registers.
Okay. In all axes?
Right.
Okay. VERB 76; MODE CONTROL, AUTO.
Okay, it's in AUTO.
P35.
We're in 35.
Okay. VERB 93.
Got it.
2209.
Yes, let me have that; I'll - continue with the plot.
Okay.
I want to put another film MAG on and get more of
Stuart than I've got left on this one. I've got
a batch of empty MAGs.
Okay.
05 22 48 05 LMP 84.
05 22 48 18 CDR We're right on the nominal. Right on the nominal plot.
05 22 48 43 CMP Man, I tell you, your lights are really bright from out here.
05 22 48 52 CDR Glad you like it. Okay, you're in sunlight, huh? Yes, there he is.
05 22 49 34 CDR So are we in sunlight.
05 22 49 41 CMP Man, that ... slow.
05 22 49 44 CDR (Laughter) You get a little star down here?
05 22 50 18 LMP Okay, dock. T8.
05 22 50 42 LMP Okay; T8, 250 at 10.
05 22 50 50 CDR You got to focus it.
05 22 50 53 LMP Huh?
05 22 50 54 CDR It says here you got to focus it. They don't tell you what the focus is going to be.
05 22 50 57 LMP Well, anything on this one over --
05 22 51 00 CDR Six feet?
05 22 51 02 LMP -- 6 feet's infinity.
05 22 51 06 CDR Okay.
05 22 51 10 LMP Okay, we'll put it 250 at 10.
05 22 51 37 CDR Man, I'm glad we're not going for a long rendezvous today.
05 22 51 40 LMP Me, too.
05 22 52 06 LMP Stu, could you see us without the light? I'll turn it off.
That's affirmative. ...
Okay. It's off. Give me another camera setting, Al. For this one, it's --
Okay. 250th, f/11.
Okay. 250th --
Oh, and focus.
Okay, whatever the distance is -
Take five shots, it says.
Okay, I got the batches.
Okay, (yawning) you can start taking shots now, if you want.
Pardon?
Get - Venus up there.
Now, if I can remember where I put my camera bracket.
Okay, you had them down there. Okay.
Oh, there's a goodie I forgot.
Yes, I stuck that one in there while you were packing up.
Boy, there's just hardly any kind ...
Yes, I noticed that, Stu. It's the - seems to be right on the ball all the way. Right on the ball. The old bellyband.
You got time to check and see if that angle bracket is over in the regular stowage? I thought I put it somewhere else to get it out of your way, and I can't remember where now.
Here it is.
Good show.
Climbing up the hill.
Okay. We're up on number 2 midcourse?
Yes. We'll have comp in another couple of minutes. Twenty-nine thou and --
Man, now that is a wild sight watching ...
Twenty-nine thou and 80 degrees - 80 degrees. And ... Okay, we're bellying out just a little bit. Say again, Stu?
I was saying that's a wild sight, looking down on you with the - just about starting to cross the terminator.
Yes, I'll bet it is.
I'll bet it is.
Hey, you know, I saw the - I could see the ALSEP ... coming over the hill.
That's what they said. Ron was telling us that. Man!
I got a real good track on you ... shadow. ...
Great. You think we were pretty close to the landing site?
I should say you were.
Day 6

05 22 57 16  CDR  
05 22 57 52  CDR  
05 22 58 23  CDR  
05 22 58 29  LMP  
05 22 58 33  CMP  
05 22 58 37  LMP  
05 22 58 38  CDR  
05 22 58 42  LMP  
05 22 58 53  CMP  
05 22 59 06  CDR  
05 22 59 23  CDR  
05 22 59 25  LMP  
05 22 59 28  CDR  
05 23 00 33  CDR  
05 23 00 41  CMP  
05 23 01 06  LMP

(Laughter)

Okay. We're in final comp now for MCC-2.

Okay, NOUN 81, Stu. Minus 0.1, minus 0.2, minus 1.4.

I got them now.

I copy minus 0.1, minus 0.2, minus 1.4.

Okay, I got them.

... You got them down there?

Yes.

Okay, ... plus 0.6, minus 0.2, plus ...

Okay, very good.

I guess we'll burn it.

Okay.

If I can still help you over here.

Okay. We will burn Z first. As a matter of fact, that's all we've got left.

... 

Okay; trim to 111.
05 23 01 11 CDR


05 23 01 22 LMP

Okay. Go to POO.

05 23 01 30 CDR

Okay.

05 23 01 33 LMP

VERB 46, 11 - Oh, you had to change that. Your VERB 46, 13002.

05 23 01 40 CDR

Yes, well, we're supposed to load four jets, you see, in case we have to -

05 23 01 44 LMP

Yes. Well, do you want to put that in now or wait?

05 23 01 46 CDR

Yes, might as well.

05 23 01 47 LMP

Okay, 13002.

05 23 02 01 LMP

Okay. DAP's changed.

05 23 02 06 CC

Antares, this is Houston. How do you read? Over.

05 23 02 08 LMP

Go P47.

05 23 02 11 CDR

We read you loud and clear, Houston.

05 23 02 17 CC

Roger, Antares. How'd it go?

05 23 02 19 CDR

Well, things just as nominal as they could be. We had good TPI and then midcourses of around 1.9 and 1.1 feet per second, DELTA-V total. Give you the exact numbers if you want them, but everything's just about nominal.

05 23 02 40 LMP

And you're locked up on the steerable, Houston.

05 23 02 41 CC

We'd like the numbers for TPI, if you would, please.

05 23 02 42 CDR

Okay, Ed'll give them to you.

05 23 02 43 LMP

Stand by.

05 23 02 47 CC

Say again, Ed.

05 23 02 48 CDR

Ed'll give them to you.
Okay. The numbers for TPI: NOUN 81, plus 62.1, plus 0.1, plus 63.1; burned on time; and nulled PGNS to 00 plus 0.1.

Roger.

Okay.

Okay, you got NOUN 78s down there.

All right.

4's are running in the back.

Kitty Hawk, Houston. Are you reading us now?

I'm reading you loud and clear, Houston.

Roger, Stu. Could we have your TPI solution, please?

Everything's looking good.

Fuh?

Everything's looking good.

Yes.

I guess we'd probably better get locked up for docking.

Go ahead, Kitty Hawk.

... I had ... after TPI. And everything worked out good.

I can't lock down. No, you have to push it; you have to set it.

Sounds good.

There it goes.
Okay. I'll go back to the other configuration.

Stand by. I'm not locked in yet. One more glove to go.

Well, Bruce. I was going to send you some TV. I had it on STANDBY, and I went to TRANSMIT, and I could see the surface --

-- and all of a sudden it quit.

You ready, Al?

Just a minute.

Want some help?

Okay - Wait a minute; wait a minute. Okay, got it; go ahead.

Stand by on that, Stu. We can probably get it working again.

Okay, your rates are looking good there, man; only a couple of blips so far on these inertials.

Stu, this is Houston. I think that's a ground-commanded configuration problem. And, as soon as we're through dumping the backside tape, we'll give it back to you.

Okay. What are you doing way down there, oh Fearless One?

(Laughter) I'm coming up to find you, Rojo.

It won't be long.

Okay. First gate is 30 at 6.

Right; 6000 feet to go.

I think we're a leetle [sic] slow.

Man.
05 23 07 50  CDR  Nothing like this; I don't think I've ever seen a -
05 23 07 52  LMP  Anything quite as railroad trackish as this?
05 23 07 55  CDR  As good as this, with that much RCS fuel left.
         Man.
05 23 08 00  LMP  Well, fortunately, SIM SUP didn't see fit to work
         us out very hard today.
05 23 08 08  CDR  Yes. ... on us after the other day.
05 23 08 17  CMP  Okay, I show you at 1.52 or something like that.
05 23 08 22  LMP  We agree with that, Stu. I've got 9500 feet.
05 23 08 54  CC   Kitty Hawk, Houston. We'd like you to load the
         nominal IM weight in the DAP, please, 5700.
05 23 09 03  CMP  Okay.
05 23 09 16  CMP  I got a spot out over here where I - maybe I can
         do that, Bruce.
05 23 09 29  CDR  Okay, babe, we're coming to the first braking
         gate right on the money; no braking required.
05 23 09 34  CMP  Okay.
05 23 09 36  CDR  The next one is 3015.
05 23 09 38  LMF  That's good.
05 23 09 39  CDR  Okay.
05 23 09 42  LMF  No, 3020.
05 23 09 43  CDR  3020. Thank you.
05 23 09 48  CMP  The line-of-sight through the COAS looks real good.
05 23 09 52  LMF  Yes, the needles are nulled here.
05 23 09 59  CDR  Only because they're getting a little attention.
05 23 10 03  LMF  Yes.
05 23 10 09  CDR  Oh, boy, I tell you, it's sure nice when things go right.

05 23 10 17  CC   Okay, Stu. We're getting a good TV signal now.

05 23 10 23  CMP  Okay. I'll try a little zoom. I don't know if you can pick him up yet or not.

05 23 10 33  CC   Okay, can you tell us roughly where he is in the monitor and grid coordinates?

05 23 10 38  CDR  (Laughter) Son of a bitch never gives up, does he?

05 23 10 44  LMP  He's always got an answer.

05 23 10 50  CDR  Well, if he can get it through that tracking light.

05 23 10 54  LMP  Oh, the tracking light's off.

05 23 10 56  CDR  Oh, it is?

05 23 10 57  LMP  Yes. We're in daylight, too. I asked him if he needed it.

05 23 11 03  CMP  Right on the top of B and C. On the line in between them, it looks like, Bruce.

05 23 11 10  CC   Is that B-2 and -3?

05 23 11 13  CMP  Well, let me see. I can't see that far over to the monitor. Let me take another look. Just a minute; I'll look out the window here, first.

05 23 11 24  CC   Oh, don't worry about it.

05 23 11 38  CC   Okay. We got it now.

05 23 11 44  CDR  Two thousand feet at 20. Yes, slight out of plane but man, not enough to really even talk about it.

05 23 11 52  CC   Roger, Stu. We've got him at the left-hand edge of our picture about one-third of the way down from the top. Growing bigger every second.

05 23 12 00  CMP  Okay.
Okay, Stu, I'm going through gate 2. And we're braking.

Roger.

Braking complete.

We lost your comm, Stu; it's breaking up now.

Okay. The next gate is -

1510 feet per second.

1510.

Boy, he's getting big out there, too.

He's bigger than we are.

0.26, 0.25. Okay, we're going through gate 3 and we're braking.

Ten feet per second.

Last one is 600 feet at 5, right?

Right.

Looking mighty pretty.

Yes, so do you.

You too; you too.

Hope you didn't drink any of the coffee while we were gone. Sure is going to taste good.

(Laughter) Have to worry about that, huh?

That was a bonus for this flight. Corner all the coffee. Didn't even make Stu unhappy at all.

Okay, I believe I'll just have a few pictures of you here.

Okay. I was just getting ready to turn mine on too, Stuart.
Okay. We're going through the final gate, slowing to 5. And we've got it.

Oh, you look good.

You lost a little weight since the last time I saw you.

Yes.

Yes, verily. It runs in the crew.

Okay. You going to take pictures of his turnaround now with the --

I'll take it with both cameras --

-- with the Has -- with the Has -- with both of them, okay. I'll try to stop it at about 100 feet, Stu; that should be a good range, for turnaround.

Okay.

You're going to have to help me because I haven't got a clear window, but - Shuffle the camera back and forth.

Can we stop flying, first?

Yes.

Okay. We're slowing down, now.

Okay. We'll ease it on in a little more.

Houston, Antares is stationkeeping at about 100 feet. Closing in a little more for the pictures of the service module and command module.

Roger, Al. We got you on television, and it's looking beautiful.

Not nearly as good as the command module locks.

Okay, any time you're ready, Al, you --
Okay, we've got you, Stu. Go ahead and turn it around; we'll photograph you.

Okay. I'm going to turn the TV off, here.

Stu - hey, Stu, looking at the ascent stage of the IM, it looks like there's something hanging loose from the bottom of it. A piece of wire or insulation or anything. Any comment on that?

Yes, I saw that. I was going to wait until we got in a little closer. Probably part of the separation plane, I'm sure. Okay, I'm going to turn the TV off here before I blast it into the Sun on this pitch around, Bruce.

And, Stu, we'd like to confirm that you got the IM weight of 5700 pounds loaded in the DAP prior to docking.

Okay.

Okay, I see a smooth loop there.

That's - that's no problem, Bruce, because I dock and I'll go FREE. And then, I'll get all that squared away, but I - I'll load it in. Okay, stand by 1, here.

Yes.

Okay, I shall do a loop, Leader.

Okay, make it smooth.

And around we go.

Show us a little style. Oh, you look good.

There I was at 240,000 coming over the top.

And there's our home. That's our home away from home.

Would you believe 360,000?

Yes.
Okay, Houston. Kitty Hawk is doing an extremely smooth loop. We're sitting at 70 feet, watching him go round. He looks very clean.

Okay. Engine bell looks very clean. All these streak patterns are radial and uniform. No hot spots at all.

Looks pretty nice.

Okay, now, you want to put that thing down; let me review the - No, the - the timeline instead of the docking procedures again?

Okay.

I'll look at them.

Starting to drift off.

Man, the old Earth went right through the COAS.

I'll take them.

Okay. And down through here, got - radar's driving to 00320.

Yes, I'll check and keep you honest. Just a second, Al.

Okay.

Oh, you look clean. Nice and clean, Stu.

Okay.

I'll come in a little closer and save you some gas.

Ed, this is Houston. When you get a chance, on panel 16, would you check the ASA and AEA circuit breakers? We've lost data from the AEA only. Over.

They're both in.

About close enough?
<table>
<thead>
<tr>
<th>Time</th>
<th>Actor</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>05 23 22 43</td>
<td>CMP</td>
<td>Yes, that ought to do it.</td>
</tr>
<tr>
<td>05 23 22 48</td>
<td>LMP</td>
<td>Okay, we go to DOCK; SHAFT/TRUNNION, 50. I'll park the antenna for you, Al.</td>
</tr>
<tr>
<td>05 23 22 57</td>
<td>CDR</td>
<td>Okay, I've already called 00320.</td>
</tr>
<tr>
<td>05 23 23 02</td>
<td>LMP</td>
<td>Okay. The - -</td>
</tr>
<tr>
<td>05 23 23 03</td>
<td>CDR</td>
<td>Should - should be there. Okay, open RENDEZVOUS RA - -</td>
</tr>
<tr>
<td>05 23 23 09</td>
<td>LMP</td>
<td>Let me - let me look at it first.</td>
</tr>
<tr>
<td>05 23 23 10</td>
<td>CDR</td>
<td>All right.</td>
</tr>
<tr>
<td>05 23 23 11</td>
<td>LMP</td>
<td>Okay. It's good. It's there.</td>
</tr>
<tr>
<td>05 23 23 13</td>
<td>CDR</td>
<td>Okay, RENDEZVOUS RADAR breaker - -</td>
</tr>
<tr>
<td>05 23 23 14</td>
<td>LMP</td>
<td>Wait a minute. All right, that's good enough.</td>
</tr>
<tr>
<td>05 23 23 16</td>
<td>CDR</td>
<td>- - coming open.</td>
</tr>
<tr>
<td>05 23 23 17</td>
<td>LMP</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 23 23 18</td>
<td>CDR</td>
<td>Okay, Stu, if you've got it, I'll pitch it around.</td>
</tr>
<tr>
<td>05 23 23 22</td>
<td>CMP</td>
<td>Okay. I - I've got the stationkeeping.</td>
</tr>
<tr>
<td>05 23 23 25</td>
<td>CDR</td>
<td>Okay. I'll cut up a little bit here. That should be about right. And we pitch.</td>
</tr>
<tr>
<td>05 23 23 30</td>
<td>CMP</td>
<td>Houston, what that is trailing is a little bit of that foil - -</td>
</tr>
<tr>
<td>05 23 23 33</td>
<td>CDR</td>
<td>Okay.</td>
</tr>
<tr>
<td>05 23 23 34</td>
<td>CMP</td>
<td>- - on the bottom part of that tank area, there.</td>
</tr>
<tr>
<td>05 23 23 37</td>
<td>CDR</td>
<td>2***3 -</td>
</tr>
<tr>
<td>05 23 23 39</td>
<td>CMP</td>
<td>Looks like during separation, the foil - -</td>
</tr>
<tr>
<td>05 23 23 41</td>
<td>CC</td>
<td>Thank you, Stu.</td>
</tr>
<tr>
<td>05 23 23 42</td>
<td>CDR</td>
<td>232.</td>
</tr>
</tbody>
</table>
-- that insulation got - got ripped. The other side is down tight. And the side you're looking at there is - is ripped out pretty badly.

05 23 23 58 CDR 233.
05 23 23 59 CC Roger. Thank you, Stu. And we got a real good TV picture.
05 23 24 03 CDR 323.
05 23 24 12 LMP Okay, 36, tracker reset. Okay. Your CGAS to the overhead window?
05 23 24 29 CDR Okay.
05 23 24 30 LMP It's the only thing that's remaining.
05 23 24 31 CDR I don't believe it.
05 23 25 05 CDR Okay. We're about there, Stu. Got about 20 more degrees to go.
05 23 25 12 CMP Okay.
05 23 25 29 CDR Okay, how does that look for pitch?
05 23 25 35 CC Antares, this is Houston. Request LO BIT RATE, AFT OMNI. Over.
05 23 25 39 CDR Okay. Now let's just wait again, then.
05 23 25 41 LMP Say again?
05 23 25 42 CLR Get the pitch.
05 23 25 43 CMP You want LO BIT RATE, AFT OMNI.
05 23 25 45 CDR Okay, we yaw from here.
05 23 25 46 LMP Yaw right to aline.
05 23 25 48 CDR Okay.
05 23 25 50 CMP I wouldn't come in much closer than that, Al.
05 23 25 52 CDR I thought you had it, Stu.
Aren't you going to do your roll?
Yes, I'm going to do my roll right now.
Okay.
Do you have formation flight?
Yes.
Okay, I'm starting my roll.
Okay, I'm within about 15 degrees. If you want to give me your mark, I can stop it about where you need it.
Okay, why don't you just stop it there. I need to translate down and to the right, anyway.
Okay, I'll stop it there.
Okay.
Houston, this is Antares. Over.
Kitty Hawk, we show you P47 for the docking. Go ahead, Antares.
Roger. You're on the OMNiS, and be advised I seem to have lost AGS, although I have no warning.
Okay, Ed. Let me see the checklist a minute, please?
Okay, Houston, I have --
Roger, Ed. We copy.
05 23 27 31 CMP Houston, I have the LOGIC ON and would like a GO for PYRO ARM —

05 23 27 34 LMP We are complete, Al, except shutting it off when you dock.

05 23 27 37 CDR Okay.

05 23 27 38 LMP You're in plus-X.

05 23 27 41 CDR Okay. We're going to let Stu try it, and we're not going to trust plus-X in the first attempt. Okay, Stu?

05 23 27 46 CC Kitty Hawk, Houston. You're GO for PYRO ARM.

05 23 27 51 CMP Okay. They're coming off.

05 23 28 07 CDR We ought to get a wild illusion with this yaw angle, for us, watching the ground.

05 23 28 12 LMP Yes.

05 23 28 13 CC Antares, this is Houston. We'd like to get the steerable up. PITCH, 170; YAW, plus 55; HIGH BIT RATE and request that you and Kitty Hawk do not make contact until we establish good telemetry. Over.
Roger. We understand that. Say again the angles now; let's check them.

Okay. PITCH, 170; YAW, plus 55, Ed. Over.

I got it. Okay, I'm locked up, Al.

Good. Okay, we're locked up, Stu.

Say again?

We're locked up now, so press on.

Houston, we're locked up. How do you read? Wait a minute. They may not have HIGH BIT RATE yet.

Roger. Loud and clear, Ed, and we have HIGH BIT RATE.

Okay.

Okay, I guess that means you're GO for docking, Stu.

I can't believe you're docking.

Apollo 14, this is Houston. You're GO for the docking.

Roger. We got you.

This has been your docking practice flight, Stu.

Yes. How about that?

Where's he at?

Huh? You see him?

Yes.

Here he comes. And he's doing it. Okay, I'm going to swing around and take a look at that probe - I don't think we're doing anything - really see. We're not too ...
05 23 30 19  LMP  I don't think you're going to be able to see it very well, are you?

05 23 30 21  CDR  Oh, it's hard to get in there. Hell, I can't - Let me get out of this son of a bitch.

05 23 30 37  CDR  Might be able to see whether that's flush enough - before we dock.

05 23 31 10  CDR  You ought to be able to. ...

05 23 31 35  CDR  Okay, the central pin looks flush, Stu.

05 23 31 47  CDR  It looks flush, right on out there.

05 23 31 51  CMP  Say again?

05 23 31 53  CDR  I'm looking at the end of the probe and the pin looks flush.

05 23 32 05  LMP  Okay, get back in here.

05 23 32 11  CDR  We're standing by for your capture call to go FREE.

05 23 32 30  CMP  Okay, we capture.

05 23 32 32  CDR  Okay, we're FREE.

05 23 32 39  CC  Beautiful. Normal docking.

05 23 32 46  CDR  Stand by for those latches.

05 23 32 50  LMP  There we go.

05 23 32 51  CDR  Okay.

05 23 32 52  CMP  Got a hard dock.

05 23 32 53  CDR  Ripplefire again.

05 23 32 55  LMP  Let me look at that schedule.

05 23 32 57  CC  Beautiful.

05 23 32 58  LMP  144:12. There we are.
A big sigh of relief being breathed around here.

All over the world, there is.

You ought to try it from up here.

(Laughter)

Okay.

Verify --

This world and out of this world, too.

Verify the FORWARD DUMP VALVE, AUTO.

Okay, FORWARD DUMP VALVE's AUTO. We ought to reconfigure VHF so - Stu won't have to listen to everything - even music.

Yes.

Let me - let me clean up over here and I'll be with you.

He can shut his off.

Yes. Okay, FORWARD DUMP VALVE's AUTO.

Okay.

Okay. Now, Stu, I'll go --

Antares, Houston. When you have a --

Okay, you have it, Houston. We'll have to hold. Why don't we take these things off?

All right, Houston. Are you going to give me LM and command module weights?

Ed, this is Houston. Understand you want the command module weight now?

Whenever you have them, I'm ready to copy. Let's press on.
05 23 34 27 CC  Okay.  CSM is 34727 and the LM is 5103.  Over.
05 23 34 41 LMP  Understand.  5103, 34727.
05 23 34 50 CC  Correct, Ed.
05 23 34 52 LMP  Okay, Al.  CABIN FAN 1, open.
05 23 34 56 CDR  Okay, CABIN FAN 1, open.
05 23 34 58 LMP  Okay.  Put the window shades up.
05 23 35 04 CC  And, Kitty Hawk; Houston.  When you're through
                with what you're doing there, Stu, I do have a
                SEP pad for you and a - an updated DAP load, but
                there's no rush on either one.
05 23 35 15 CMP  Okay.  I'll take the DAP load now.  That's what
                I'm working on.
05 23 35 21 CC  Roger.  CSM is 34727.
05 23 35 27 CDR  Okay.
05 23 35 34 CMP  34727; thank you.
05 23 35 37 LMP  Okay, crash bars up.
05 23 35 39 CC  LM, 5103.
05 23 35 44 CDR  Okay.  For the first time in the flight.
05 23 35 48 CMP  Okay, and 05103.
05 23 35 51 CDR  We want to take this back, don't we?
05 23 35 53 LMP  What's that?  Yes, you're damn right.
05 23 36 02 CC  Antares, Houston.  I have a LM impact P30 pad
                for you when you're free.
05 23 36 11 LMP  Roger.  Give me 5 seconds.
05 23 36 16 CDR  Okay, ATTITUDE, DIRECT; TTCA, DISABLE; ACA/JET,
                DISABLE.
Well, I guess we better get to cracking, troops. I've got to put your 160 pounds of rocks some place.

Yes. We can't do it until we get the tunnel open.

Roger. I'll be working on that in just a second here. I'll start equalizing.

Yes, it's going to take me awhile to copy these pads, Al. So you'll have to press on with that.

Press on with what, Ed?

I said you're going to have to press on with that, because it'll take me a little while to get these pads squared away.

Roger.

Okay, Antares. I'm going to be off the air for about 3 minutes here.

Okay, Stu.

All right, Bruce. Call up your P30 pad.

I'm ready to copy P30 pad.

Okay. P30 purpose, goodbye LM. Tg 147:54:18.90; NOUN 81, minus 0182.0, plus 0039.0, plus all balls; H_A and H_P are NA; DELTA-V_R 0186.1; 1:15; 012, 176; minus 0181.9, plus 0039.0, minus 0006.0. Read back. Over.

Roger. Impact P30 pad. 147:54:18.90; minus 0182.0, plus 0039.0, plus all zeros; H_A, H_P, NA; 0186.1; 1:15; 012, 176; minus 0181.9, plus 0039.0, minus 0006.0. End of pad.

And you've already got the LM weight.

That's affirm.
Okay, Ed. If you would, we’d like a few words from you on the subject of the AGS. We’ve lost the AGS downlink telemetry and sort of at a loss as to what its current status is. Could you spare a little time for that?

Roger. It performed beautifully up until the time you asked me to check circuit breakers. I looked, and the circuit breakers are okay. I started to look at it for a backup braking gate about that time, and found I could not access it. Furthermore, the ball, the AGS ball, is still at 150 degrees pitch, zero yaw, zero roll and has been for some time. And I have no warnings, all the circuit breakers are in, but I cannot access it to get a self test.

When was the last time you tried to access it, Ed?

Well, just now and –

Successfully.

– Oh, about – oh, shortly before we hit the braking gates.

Ed, this is Houston. We’d like you to – on panel panel 16, cycle the ASA and AE circuit breaker – AEA circuit breaker, if you would, please.

Okay. They’re cycled. I – In further answer to that last question, Bruce, it was some – somewhere around AGS, but I don’t remember exactly where.

*** Ed. That’s close enough.

Good enough. I abandoned the AGS and started setting up cameras for the docking about that point. You coming out, Al?

No, I got the screw out all right, and it looks like that ought –

Okay, Ed –
Oh, those springs just hook; I think you can just get rid of them.

And if you didn't see any change, we'd like you to take the AGS operate switch - the AGS STATUS switch and cycle it from OPERATE to STANDBY and back to OPERATE; and, if that doesn't do any good, on panel 11, we'd like to close the Commander's AEA circuit breaker. Over.

Okay. That hasn't done any good. We'll try the other one.

That doesn't seem to help either, Bruce.

Okay. Which one was that?

Any of them. I - have put in the Commander's circuit breaker and still have not gotten anywhere with it.

Okay. Let's skip the AGS and leave it in its present situation, and I've got a few items I'd like to read off for return - over and above the nominal return items.

You've checked coming out of that - thing.

It's not?

Ed, this is Houston. I'd like to read you up some extra return items, if you've got a piece of paper around.

Okay, I'm ready to copy.

Okay. Item number 1, the 100-foot tether. Over.

Okay, we got that one.

Number 2, the LEC waste-tether combination. Over.

Okay.

Number 3, 30-foot tiedown webbing. Over.
05 23 44 40 LMP Okay.
05 23 44 43 CMP Okay, I'm cracking the hatch now.
05 23 44 45 CC Item number 4 --
05 23 44 46 CDR Okay.
05 23 44 47 CC -- We would like to bring --
05 23 44 48 CDR Okay, Stu.
05 23 44 49 CC -- back the Commander's Hasselblad and recommend that that go in the ISA. If you want to bring back the LMP Hasselblad, also, that could go in B-1, *** Commander's Hasselblad. Over.
05 23 45 05 LMP (Cough) We thought about bringing them both back, but since you said not to, we left one on the surface. But you'll have the CDR's.
05 23 45 14 CDR Man, I can't figure out what the hell's --
05 23 45 17 CC -- 5, we want both of the LMP's EVA gloves. Over.
05 23 45 23 LMP Okay, they're aboard.
05 23 45 30 CC And, of course, we're going to bring back the docking probe. Now, on stowage: the first three items, the tethers and the webbing can go in the temporary stowage bags in the command module. The Hasselblad in the ISA, which is normal, and your gloves can go in the PGA bag, and the probe up underneath the right-hand couch in the temporary stowage location.
05 23 45 56 LMP Okay, we've already stowed most of this stuff, Bruce. The tether - the 100-foot tether is already in the ISA (clears throat); the LEC waste tethers can go in the TSB and so can the 30-foot tiedown webbing. The Commander's Hasselblad, we can put in the ISA; the EVA gloves are already in the ISA.
05 23 46 24 CDR I'm not going to be able to get it. I don't know what the hell's the matter with this thing.
Okay. Stand by, please.

Just not going to come, huh?

No, I got those screws out just fine. And that thing that looks like it's going to - supposed to flop down - ought to flop down? That little - -

And it won't flop down?

- - split bearing, that bushing there?

Yes?

Can't get that to flop for sour owlshit.

Well, did you try to pry it on it?

Man, I've been trying to pry it and push it -

Well, that's supposed just to break right loose. Let's - let's look on the bottom. Did you?

See, it looks like it'd pivot.

Yes, it's supposed to.

Well, let's leave this stuff right here for the moment.

Okay. Stu's cracking the hatch.

Yes, stay on our time line. Okay, this purse ought to go in the - ISA bottom forward pocket.

Okay, going to keep us honest?

Trying to.

Ed, this is Houston. Over.

Go ahead.

We'd like to get the - the tethers, especially the 100-foot tether, out of the ISA, because you're going to be bagging the ISA in a - a contamination bag, and we plan on using the
100-foot tether, the LEC waste tether, and the 30 feet of tiedown for securing the docking probe for reentry; so we'd like - If you can do it without impact, we'd like you to get that stuff out before you put the ISA in the contamination bag. All the other stowage is okay. Over.

05 23 48 03 LMF  Okay, we'll see what we can do. Did you hear that?
05 23 48 05 CDR  We've got lots of time to do that on the way home.
05 23 48 06 LMF  Well - -
05 23 48 07 CC   Roger.
05 23 48 08 LMF  No, but we've got to put it in the DECON bag just a little while. If we can rip that 100-foot tether out right now, why, we'll save ourselves a lot of headache.
05 23 48 18 CDR  Okay.
05 23 48 25 CDR  Okay.
05 23 48 28 LMF  If you could stick this in there when you're getting in -
05 23 48 29 CDR  Okay, I guess I'll just have to - get baby now, huh?
05 23 48 36 CC   Kitty Hawk, Houston. Are you back on the line? Over.
05 23 48 40 CMP  That's affirmative.
05 23 48 45 CC   Okay. I don't want to interrupt, but whenever you're free, I've got your SEP pad.
05 23 48 50 LMF  Okay, Al, empty your PGA pockets into the accessory - -
05 23 48 53 CMP  Why don't I take it now?
05 23 48 54 LMF  - - accessory bag in the flight data file.
05 23 48 58 CDR  Okay.
05 23 49 01 CC  Okay, let me know when you're ready.
05 23 49 04 CMP  Well, let her rip.
05 23 49 08 CC  Okay. CMS SEP, RCS, $T_{ig}$, 146:30:00:00; NOUN 81, minus 0001.0; Y and Z are all zips; roll, 301 --
05 23 49 32 LMP  Find that - That's it.
05 23 49 33 CC  -- 355, 348. The rest of the pad is NA; remarks: LM-jettison time, 146:25:00; and the roll, pitch, and yaw for LM jettison are the same as for SEP. Over.
05 23 50 01 CMP  Okay. SEP pad, 146:30:00:00; $\Delta V_x$, minus 1.0, all zips, all zips; 301, 355, 348; jettison, 146:25:00:00; 301, 355, and 348.
05 23 50 31 LMP  Okay, can I pass it on to you so I can get - get on back to work here?
05 23 50 35 CDR  Where do you want to put it, back in the data file?
05 23 50 37 LMP  Huh? Well, that's as good a place as any right now.
05 23 50 39 CDR  Yes.
05 23 50 42 LMP  Okay, Bruce. I'm ready to copy any pads you have for me.
05 23 50 48 LMP  You can - Al, you can place the LEVA bags on the floor, right side and forwards.
05 23 50 50 CC  Ed, this is Houston. I believe we're up to date already on you.
05 23 50 56 LMP  Okay. Misunderstood. I thought you had a call for me a minute ago.
05 23 51 06 LMP  Okay, let's take the LEVA bags.
05 23 51 07 CDR  Okay.
05 23 51 08  LMP  One - We'll put them on the floor, right side forward. Both of them, both of them.

05 23 51 17  LMP  ...

05 23 51 24  CDR  Man, that was a beautiful rendezvous.

05 23 51 28  LMP  Sure was.

05 23 51 29  CDR  Everything worked perfect. Okay, here they come. Right side forward.

05 23 51 37  CC  Kitty Hawk, Houston. We'd like to get POO and ACCEPT, if that's convenient with you, and confirm all the ROTATIONAL HAND CONTROL POWER, DIRECT switches, OFF, please.

05 23 51 52  CMP  Okay. You've got POO and ACCEPT, and DIRECT, OFF.

05 23 51 55  CDR  Okay. Let me turn these lights off, and we can cut those bastards off, anyway.

05 23 52 10  CDF  Okay, just a minute. Let me --

05 23 52 13  LMP  Stu, are the pressures equal in the tunnel yet?

05 23 52 14  CMP  That's affirmative. I'm about to drop the hatch.

05 23 52 18  LMF  Okay. OVERHEAD DUMP VALVE, AUTO, Al.

05 23 52 20  CDR  OVERHEAD DUMP VALVE's in AUTO.

05 23 52 24  LMF  Okay. PRESS REGS A and B, EGRESS.

05 23 52 29  CDR  Okay. A is EGRESS, B is EGRESS.

05 23 52 34  LMP  Okay. Stow the 70-millimeter camera with MAG in ISA bottom pocket.
05 23 52 52 CMP And, Ed, did you verify, or Al, the FORWARD DUMP VALVE to AUTO?

05 23 52 56 LMP That's verify, Stu.

05 23 52 57 CMP Okay.

05 23 53 07 CDR Okay.

05 23 53 08 CMP How dusty was it down there?

05 23 53 12 LMP Well, we don't have a lot of dust in here, but our suits are sure filthy.

05 23 53 15 CMP Okay.

05 23 53 18 CDR Okay.

05 23 53 19 LMP Where's the tool kit?

05 23 53 21 CDR It's hanging on the instrument panel. Going to try yours?

05 23 53 29 LMP Yes, but I want to get this cable over here first.

05 23 54 00 LMP Okay. You can put the - camera - this camera in the ISA top pocket.
Okay. Stand by.

In the bag.

Say, I'll tell you; there's one thing about this data file. It just is not made for me.

Yes, it's not the easiest one to work with.

That son of a bitch is all full.

Well - What's all full?

The damn data file. Yes, I can get it in there, I guess.

Well, it ain't going to make it.

What's not going to make it?

Well, it's part of the data file; it's rendezvous charts.

Well, stick it in the purse.

Well, that data file is supposed to be available to us - yes, put it in the purse - should be available to us in debriefing.

Yes, we can get it out of the purse.

Okay.

Okay, let me get this - Are we through with the purse?

You can put this in it. This you give me goes in the ISA top pocket.

Get your scissors?

No, I don't. Where - They're in the data file.

Okay.

Just stick them in the accessory bag there with that other personal stuff that we find, unless you want to use it.
05 23 56 01 CDR Yes. Better cut those lights off again.
05 23 56 04 LMP Cut what?
05 23 56 05 CDR Cut those lights off.
05 23 56 06 LMP What lights?
05 23 56 08 CDR The -
05 23 56 12 LMP Utility lights?
05 23 56 13 CDR Yes.
05 23 56 14 LMP Well, hell, I've got dikes for that, Al, and I just reach up and take them off like this.
05 23 56 19 CDR Okay. Just stick those in the purse.
05 23 56 28 LMP Here they are.
05 23 56 38 LMP Here's all these goodies.
05 23 56 39 CC Kitty Hawk, Houston. Computer is yours.
05 23 56 48 CDR Put them in there.
05 23 56 57 CDR One of them's still warm.
05 23 56 58 LMP Huh?
05 23 57 00 CDR That camera's still warm.
05 23 57 02 LMP It is? Well, hell, it was running just a minute ago.
05 23 57 14 LMP Okay, Al, now that you got those out of the way.
05 23 57 20 CDR Well, I haven't got them out of the way. I'm going to put them in the ISA.
05 23 57 23 LMP Okay.
05 23 57 25 CDR Now, you want me to get the ISA - you want me to get 100-foot tether out of there?
05 23 57 28 LMP Yes, you'd better.
Okay. Why don't you hold the purse, and let me get the ISA down, then.

Okay.

Because we - I'll have to get into it - Damn - Have to get into it to find out what we're looking for there.

We're - running kind of late.

Well, we can always get it up on the way back.

Well, we got to stow this damn -

Kitty Hawk, Houston. Were you calling?

Well, if you can find it handy, go get it, Al. Otherwise, don't.

It's not a - it's not a 100-foot tether; it's a 50-foot tether. You talking about the one in that bag?

Yes, they want the one we took out on the lunar surface.

Yes. It's 50 feet.

It's 100 - It's supposed to be. Well, there's 50 for you and 50 for me but -

Shit.

I don't know. I don't feel it in there, anyway.

You sure you put it in there and not in the other compartment?

Shoot, I don't know. I thought we stuck it in here. Look in the purse; maybe it's in there.

No. Well, we really haven't got time to look for it. We're just going to have to --

I don't think so. Give me the -- stick the purse in here.
05 23 59 32  LMP  Huh?
05 23 59 33  CDR  Stick the purse in here.
05 23 59 34  LMP  Okay.
05 23 59 41  LMP  I got one more item - a couple of more items, if it'll go.
05 23 59 44  CDR  In the ISA?
05 23 59 45  LMP  Yes. Did you get the PPKs and the flag kit out?
05 23 59 48  CDR  No, hell no. You didn't tell me to.
05 23 59 51  LMP  Okay.
05 23 59 52  CDR  Got plenty of room in that.
05 23 59 54  LMP  Okay.
05 23 59 55  CDR  Plenty of room.
06 00 00 18  LMP  Okay. All this stuff -
06 00 00 32  CDR  Huh?
06 00 00 39  LMP  These, we'll just forget about and stick them back. I don't know what they are.
06 00 00 44  CDR  All right. Those are in.
06 00 00 48  LMP  Pardon?
06 00 00 49  CDR  Those are all in. What's next?
06 00 00 53  LMP  Okay. Flag kit, unstow sample bag, left-hand stowage compartment, temporarily stow in aft cabin under netting.
06 00 01 06  CDR  In aft cabin under netting?
06 00 01 08  LMP  Yes, just hide it out of the way.
06 00 01 12  CDR  You mean the rocks?
06 00 01 14  LMP  Yes. So we can put them in DECON bags later, Al.
I think I'll just leave them right where they are.

Why now?

No, no, we don't want to because the goddarn drogue comes in here, gets in the way.

Okay, it's...

Could you stuff them back there under the netting somewhere?

Okay?

Okay, open the hatch -

Apollo 14, this is Houston; 12 minutes to LOS.

Okay, Bruce. We got to get the hatch open; we're - we're about 20 minutes late.

Stu's working on it now; I can hear him. Hell, we can open the hatch, anyway.

Yes, open ours.

Let me just go to DUMP on this valve, just to be sure. Look at DELTA-P across here.

Is it?

Yes.

Well, the DELTA-P's higher on our side, then. There shouldn't be any DELTA-P from his side.

Okay, we just went up a little bit.

Okay, watch the ISA for a minute.

Why don't you grab the drogue and bring it on in and tie it down?

Okay. Let's see. Hey, that baby's hot.

Okay, here comes the drogue. Howdy, how are you doing?
06 00 03 37 CMP  Okay.
06 00 03 38 CDR  Nice docking.
06 00 03 39 CMP  Man.
06 00 03 40 CDR  It worked okay that time, huh?
06 00 03 42 CMP  Yes. It sure did. I even ... too. ...
06 00 03 50 LMP  Yes, I got the ISA out of your way.
06 00 03 51 CDR  Okay. Reach.
06 00 03 53 CMP  ... back and safe.
06 00 03 56 LMP  Hold on just a second. Grab the LEC - package out of there. That's the waste-tether package, isn't it?
06 00 04 11 CDR  I think so. Yes.
06 00 04 12 LMP  And the two - and the two brushes?
06 00 04 14 CDR  Yes.
06 00 04 15 LMP  Okay. Let me have them.
06 00 04 17 CDR  Do we need the waste tether to tie down?
06 00 04 18 LMP  Yes.
06 00 04 20 CDR  Okay.
06 00 04 31 CDR  I got nothing else in there we need. Here's some tape. Do we need that?
06 00 04 38 LMP  Okay. Tape, we need.
06 00 05 01 LMP  Okay, can you tie that drogue down there?
06 00 05 04 CDR  Sure. Sure can.
06 00 05 09 LMP  Okay, there's nothing else in those pockets now that we need back there, is there?
06 00 05 12 CDR  I don't know; I was going to look at it.
Double check because I - There shouldn't be, because I've gotten them all out, but -

Here's your pills.

Okay, tie it down and let's move on.

Oh, another thing, we have those rocks in there. You got the rocks out so we're all set. Okay, it's tied down.

Okay.

Hey, Stuart. We'll take our helmet - accessory bags first, if you don't mind.

Hell, the accessory bags.

I mean helmet bags; we've got the accessory bags.

You ought to put something in those. What did we put in there? We put a glove or something of yours in one of those, didn't we?

What?

Okay, it's tied down. Okay, the drogue's tied down. What's next?

Okay, that's all. Now help me get this - We need the DECON bags, the helmet bags, and start getting stuff over to Stu.

Okay.

Hey, Al.

Yes.

... Remember where you put them? I don't believe I've seen them.

Yes, they're in the temporary stowage bag on your side, I think.

Okay.

Let's see.
Why don't you put your helmet, your gloves, and your helmet -

There's one glove.

You lost a glove?

Yes, it's floating around somewhere.

... Here, let me take ...

Zipping what?

Start unzipping these suits.

Okay.

...